

VERITAS NetBackup™ 4.5 for Oracle

System Administrator's Guide

Windows NT/2000

March 2002
30-000493-011



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Preface

This guide describes how to install, configure and use VERITAS NetBackup for Oracle on a Windows NT platform. In this guide, VERITAS NetBackup for Oracle on Windows NT is referred to as NetBackup for Oracle.

For specific information about the NetBackup server software, refer to:

- ◆ *NetBackup System Administrator's Guide for UNIX*, if you have a UNIX server.
or
- ◆ *NetBackup System Administrator's Guide for Windows*, if you have a Windows NT/2000 server.

This document is the same as `NetBackup_AdminGuide_Oracle_NT.pdf` distributed with the NetBackup for Oracle on Windows software.



Audience

This guide is intended for the:

- ◆ Oracle database system administrator responsible for configuring and using the Oracle7 Enterprise Backup Utility or Oracle Recovery Manager to back up and restore Oracle databases.
- ◆ NetBackup system administrator responsible for configuring NetBackup.

A system administrator is defined as a person with system administrator privileges and responsibilities.

This guide assumes:

- ◆ A basic understanding of system administration.
- ◆ A working understanding of the NetBackup client and server software.
- ◆ A familiarity with the information covered in the following NetBackup manuals:
 - *NetBackup User's Guide for Microsoft Windows*
 - *NetBackup System Administrator's Guide for UNIX or NetBackup System Administrator's Guide for Windows*
 - *NetBackup Troubleshooting Guide for UNIX or NetBackup Troubleshooting Guide for Windows*
- ◆ A thorough understanding of:
 - Oracle7 Enterprise Backup Utility
 - Oracle Recovery Manager

Accessibility

NetBackup contains features that make the user interface easier to use by people who are visually impaired and by people who have limited dexterity. Accessibility features include:

- ◆ Support for assistive technologies such as screen readers and voice input (Windows servers only)
- ◆ Support for keyboard (mouseless) navigation using accelerator keys and mnemonic keys

For more information, see the NetBackup system administrator's guide.

Organization

This guide is organized as follows:

- ◆ The first chapter in this manual describes the technical features and concepts of NetBackup for Oracle on Windows.
- ◆ The Installation chapter explains how to install NetBackup for Oracle on Windows on your system.
- ◆ Configuration describes how to configure NetBackup and the Oracle7 Enterprise Backup Utility or Oracle Recovery Manager for use with NetBackup for Oracle. This information supplements the NetBackup administration manuals.
- ◆ The Using NetBackup for Oracle on Windows explains how to use NetBackup to perform backups and restores of Oracle databases. This information supplements the NetBackup manuals.
- ◆ Troubleshooting explains how to use NetBackup logs to troubleshoot NetBackup for Oracle operations. This information supplements the NetBackup manuals.



Related Documents

The following documents provide related information. For a more detailed listing of NetBackup documents, refer to *NetBackup Release Notes*.

If you have a UNIX server, refer to these documents:

- ◆ *NetBackup System Administrator's Guide for UNIX*
Explains how to configure and manage NetBackup on a UNIX system.
- ◆ *NetBackup Media Manager System Administrator's Guide for UNIX*
Explains how to configure and manage the storage devices and media on UNIX NetBackup servers. Media Manager is part of NetBackup.
- ◆ *NetBackup Troubleshooting Guide for UNIX*
Provides troubleshooting information for UNIX-based NetBackup products. You can also refer to www.support.veritas.com, access the Knowledge Base Search option, and search for TechNotes.

If you have a Windows server, refer to these documents:

- ◆ *NetBackup System Administrator's Guide for Windows*
Explains how to configure and manage NetBackup on a Windows server system.
- ◆ *NetBackup Media Manager System Administrator's Guide for Windows*
Explains how to configure and manage the storage devices and media on Windows NetBackup servers. Media Manager is part of NetBackup.
- ◆ *NetBackup Troubleshooting Guide for Windows*
Provides troubleshooting information for Windows-based NetBackup products. You can also refer to www.support.veritas.com, access the Knowledge Base Search option, and search for TechNotes.

For this product, you may need the following manuals from Oracle:

- ◆ *Oracle Enterprise Manager Administrator's Guide*
- ◆ *Oracle7 Enterprise Backup Utility Administrator's Guide*
- ◆ *Oracle8 Server Backup and Recovery Guide*
- ◆ *Oracle7 Enterprise Backup Utility Installation and Configuration Guide*

Conventions

The following explains typographical and other conventions used in this guide.

Type Style

Typographic Conventions

Typeface	Usage
Bold fixed width	Input. For example, type cd to change directories.
Fixed width	Paths, commands, filenames, or output. For example: The default installation directory is <code>/opt/VRTSxx</code> .
<i>Italics</i>	Book titles, new terms, or used for emphasis. For example: <i>Do not</i> ignore cautions.
<i>Sans serif (italics)</i>	Placeholder text or variables. For example: Replace <i>filename</i> with the name of your file.
Serif (no italics)	Graphical user interface (GUI) objects, such as fields, menu choices, etc. For example: Enter your password in the Password field.

Notes and Cautions

Note This is a Note. Notes are used to call attention to information that makes using the product easier or helps in avoiding problems.

Caution This is a Caution. Cautions are used to warn about situations that could cause data loss.

Key Combinations

Some keyboard command sequences use two or more keys at the same time. For example, holding down the **Ctrl** key while pressing another key. Keyboard command sequences are indicated by connecting the keys with a plus sign. For example:

Press Ctrl+t



Command Usage

The following conventions are frequently used in the synopsis of command usage.

brackets []

The enclosed command line component is optional.

Vertical bar or pipe (|)

Separates optional arguments from which the user can choose. For example, when a command has the following format:

`command arg1|arg2`

the user can use either the *arg1* or *arg2* variable.

Terms

The terms listed in the table below are used in the VERITAS NetBackup documentation to increase readability while maintaining technical accuracy.

Term	Definition
Microsoft Windows, Windows	<p>Terms used as nouns to describe a line of operating systems developed by Microsoft, Inc.</p> <p>A term used as an adjective to describe a specific product or noun. Some examples are: Windows 95, Windows 98, Windows NT, Windows 2000, Windows servers, Windows clients, Windows platforms, Windows hosts, and Windows GUI.</p> <p>Where a specific Windows product is identified, then only that particular product is valid with regards to the instance in which it is being used.</p> <p>For more information on the Windows operating systems that NetBackup supports, refer to the VERITAS support web site at http://www.support.veritas.com.</p>
Windows servers	<p>A term that defines the Windows server platforms that NetBackup supports; those platforms are: Windows NT and Windows 2000.</p>
Windows clients	<p>A term that defines the Windows client platforms that NetBackup supports; those platforms are: Windows 95, 98, ME, NT, 2000, XP (for 32- and 64-bit versions), and LE.</p>



Getting Help

For updated information about this product, including system requirements, supported platforms, supported peripherals, and a list of current patches available from Technical Support, visit our web site:

`http://www.support.veritas.com/`

VERITAS Customer Support has an extensive technical support structure that enables you to contact technical support teams that are trained to answer questions to specific products. You can contact Customer Support by sending an e-mail to `support@veritas.com`, or by finding a product-specific phone number from the VERITAS support web site. The following steps describe how to locate the proper phone number.

1. Open `http://www.support.veritas.com/` in your web browser.
2. Click **Contact Support**. The *Contacting Support Product List* page appears.
3. Select a product line and then a product from the lists that appear. The page will refresh with a list of technical support phone numbers that are specific to the product you just selected.





NetBackup for Oracle on Windows integrates the database backup and recovery capabilities of Oracle7 Enterprise Backup Utility or Oracle Recovery Manager with the backup and recovery management capabilities of NetBackup and its Media Manager.

This chapter introduces NetBackup for Oracle on Windows and how it relates to Oracle7 Enterprise Backup Utility or Oracle Recovery Manager and NetBackup. Read this chapter for a description of:

- ◆ Features of NetBackup for Oracle on Windows
- ◆ Terminology for NetBackup for Oracle on Windows
- ◆ Technical Overview of NetBackup for Oracle on Windows



Features of NetBackup for Oracle on Windows

This section describes the NetBackup for Oracle on Windows main features.

Feature	Description
Media and device management	All devices supported by Media Manager are available to NetBackup for Oracle on Windows.
Scheduling facilities	<p>NetBackup scheduling facilities on the master server can be used to schedule automatic and unattended Oracle backups.</p> <p>This also lets you choose the times when these operations can occur. For example, to prevent interference with normal daytime operations, you can schedule your database backups to occur only at night.</p>
Multiplexed backups and restores	NetBackup for Oracle on Windows lets you take advantage of NetBackup's multiplexing capabilities. Multiplexing directs multiple data streams to one backup device, thereby reducing the time necessary to complete the operation.
Transparent execution of both Oracle and regular file system backup and restore operations	<p>All backups and restores are executed simultaneously and transparently without any action from the NetBackup administrator.</p> <p>A database administrator can execute database backup and restore operations through NetBackup or use Oracle Recovery Manager as if NetBackup were not present.</p> <p>An administrator or any other authorized user can use NetBackup to execute database backups and restores.</p>
Sharing the same devices and tapes used during other file backups	It is possible to share the same devices and media used for other backups or to give Oracle exclusive use of certain devices and media.
Centralized and networked backup operations	From the NetBackup master server, you can schedule database backups or start them manually for any client. The Oracle databases can also reside on hosts that are different from the devices on which NetBackup stores the backups.

Feature	Description
Graphical user interfaces	<p>NetBackup provides the following graphical user interfaces for client users and administrators:</p> <ul style="list-style-type: none">◆ Backup, Archive, and Restore user interface◆ Client user interface on Windows 95/98/2000 and NT clients◆ NetBackup Administration Console for Java◆ NetBackup Administration Console for Windows <p>A database administrator or NetBackup administrator can start backup or restore operations for Oracle from the NetBackup graphical user interface on the master server.</p>
Parallel backup and restore operations	<p>NetBackup for Oracle on Windows supports the parallel backup and restore capabilities of the Oracle Recovery Manager. This permits the user to run more than one tape device at a time for a single Oracle backup or restore, thereby reducing the time necessary to complete the operation.</p>



Terminology for NetBackup for Oracle on Windows

This section explains important terms that may be new to an Oracle database administrator or a NetBackup administrator.

NetBackup Terms

This section describes NetBackup terms as they apply to NetBackup for Oracle on Windows.

<i>NetBackup</i>	NetBackup backs up and restores files, directories, raw partitions, and databases on client systems that have Oracle databases.
<i>NetBackup policy</i>	NetBackup policies define criteria for backups and restores. These criteria include storage unit and media to use, backup schedules, clients, files to back up, or backup templates or scripts to execute.
<i>NetBackup schedule</i>	NetBackup schedules control NetBackup operations such as: when backups can occur, the type of backup (full, incremental) to perform, and how long NetBackup retains the image (retention level).
<i>Administrator directed backups</i>	NetBackup administrators are able to perform remote backups of all files, directories, databases, and raw partitions contained on client systems within a client/server network via NetBackup interfaces.
<i>User-directed backups and restores</i>	NetBackup users are able to perform backups of all files, directories, databases, and raw partitions contained on client systems within a client system.
<i>Graphical interfaces</i>	Graphical user interfaces are available for both users and administrators.
<i>Media Manager</i>	The Media Manager provides complete management and tracking of all devices and media used during backups and restores.
<i>Templates</i>	The NetBackup for Oracle wizards are used to create backup and recovery templates. These wizards are initiated from the NetBackup Backup, Archive, and Restore interface. The wizards do not support all of the RMAN commands and options provided by Oracle. A shell script should be written for situations where a template does not provide all of the required functionality.



bpdbsbora

NetBackup for Oracle also provides a utility, `bpdbsbora`, that runs the wizard-generated templates. The utility can also generate a shell script from a NetBackup for Oracle template.

Oracle Terms

Full Backup

A full backup copies all blocks into the backup set, skipping only datafile blocks that have never been used. Note that a full backup is not the same as a whole database backup; full is an indicator that the backup is not incremental.

A full backup has no effect on subsequent incremental backups, which is why it is not considered part of the incremental strategy. In other words, a full backup does not affect which blocks are included in subsequent incremental backups.

Incremental Backup

An incremental backup is a backup of only those blocks that have changed since a previous backup. Oracle allows you to create and restore incremental backups of datafiles, tablespaces, and a database. You can include a control file in an incremental backup set, but the control file is always included in its entirety, no blocks are skipped.



Multi-Level Incremental Backup

Oracle Recovery Manager allows you to create multi-level backups. Each level is denoted by an integer, e.g., 0, 1, 2, etc. A level 0 incremental backup, which is the base of subsequent incremental backups, copies all blocks containing data.

When you generate a level n incremental backup in which n is greater than 0, you back up:

- ◆ All blocks that have been modified since the most recent backup at a level n or lower (this is the default type of incremental backup, called Differential Incremental Backup)
- ◆ All blocks that have been modified since the most recent backup at level $n-1$ or lower (called a Cumulative Incremental Backup)

The benefit of performing multi-level incremental backups is that you do not back up all of the blocks all of the time. Incremental backups at level greater than 0 only copy blocks that were modified, which means that the backup size may be significantly smaller and require much less time. The size of the backup file depends solely upon the number of blocks modified and the incremental backup level.

Differential Incremental Backup

In a differential level n incremental backup, you back up all blocks that have changed since the most recent backup at level n or lower. For example, in a differential level 2 backup, you back up all blocks modified since the last level 2, level 1, or level 0 backup. Incremental backups are differential by default.

Cumulative Incremental Backup

In a cumulative level n incremental backup, you back up all blocks that have changed since the most recent backup at level $n-1$ or lower. For example, in a cumulative level 2 backup, you back up all blocks changed since the most recent level 1 or level 0 backup.

Cumulative incremental backups reduce the work needed for a restore by ensuring that you only need one incremental backup from any particular level at restore time. Cumulative backups require more space and time than Differential Incremental Backups, however, because they duplicate the work done by previous backups at the same level.

Oracle EBU Terms

Oracle7 Enterprise Backup Utility The Oracle7 Enterprise Backup Utility (EBU) is a program provided by the Oracle Corporation that lets database administrators back up and restore Oracle databases. Although EBU is able to configure and track the execution of those operations, it cannot directly manage the storage devices and media used in its backups. It must be integrated with an application that has these capabilities. NetBackup for Oracle on Windows provides device and media management capability by integrating the Oracle7 Enterprise Backup Utility with NetBackup and its media management software. Other advantages are access to NetBackup's automatic scheduling facilities and the graphical interfaces.

The Enterprise Backup Utility uses a Catalog Database to store information about the Oracle7 databases being backed up or restored through EBU. The Catalog Database also stores information about backups that have been performed. It is used to determine what needs to be restored from previous backups. The use of a Catalog Database with EBU is not optional, one must be used.

ebu command The command that you use to start a backup or restore by the Oracle7 Enterprise Backup Utility.

This command is described in the *Oracle7 Enterprise Backup Utility Administrator's Guide*.

EBU script A script that specifies the action that the `ebu` command performs (for example, backups, and restores).

Refer to the *Oracle7 Enterprise Backup Utility Administrator's Guide* (available from the Oracle Corporation) for a description of the script.



Oracle RMAN Terms

Oracle Enterprise Manager Backup Manager, the Oracle Enterprise Backup component, is a graphical user interface for the Recovery Manager (RMAN). This interface allows you to use the point and click method to perform backups and recoveries. For more information about the Oracle Enterprise Manager, see the *Oracle Enterprise Manager Administrator's Guide*.

Oracle Recovery Manager Oracle Recovery Manager (RMAN) is used to back up, restore, and recover database files. Oracle Recovery Manager starts Oracle server processes on the target database. These Oracle server processes actually perform the backup and restore. Oracle Recovery Manager performs important backup and recovery procedures, and greatly simplifies the tasks administrators perform during these processes. However, it cannot directly manage the storage devices and media used in its backups and must be integrated with an application that has these capabilities. NetBackup for Oracle on Windows provides device and media management capability by integrating the Oracle Recovery Manager with NetBackup and its media management software. Other advantages are access to NetBackup's automatic scheduling facilities and the graphical interfaces.

RMAN Repository An RMAN recovery catalog or the database control file is a repository for information that is used and maintained by Oracle Recovery Manager. Oracle Recovery Manager uses this information to determine how to execute requested backup and restore actions.

Oracle recommends that you use Oracle Recovery Manager with a recovery catalog, especially if you have 20 (or more) datafiles. However, you are not required to maintain a recovery catalog with Oracle Recovery Manager.

Because most information in the recovery catalog is also available in the target database's control file, Oracle Recovery Manager supports an operational mode where it uses the target database control file instead of a recovery catalog. This operational mode is appropriate for small databases where installation and administration of another database, for the sole purpose of maintaining the recovery catalog, would be burdensome.

For a detailed description of the recovery catalog, refer to the Oracle Backup and Recovery Guide.

rman command

The `rman` command is used to start a backup or restore by the Oracle Recovery Manager. Recovery Manager is an integral part of Oracle, unlike the Oracle7 Enterprise Backup Utility which is an optional, stand-alone add-on. This command is described in the Oracle Backup and Recovery Guide.

RMAN script

The RMAN script specifies the commands that Oracle Recovery Manager will perform (for example, backups, and restores). This command file is described in the Oracle Backup and Recovery Guide (available from the Oracle Corporation).

The Oracle Backup and Recovery Guide explains the `rman` commands and the `command` script files. Refer to that guide for details on command syntax and improving performance.

There are example RMAN scripts in the directory named `install_path\NetBackup\dbext\Oracle\samples\RMAN\`. These are shell scripts that execute RMAN commands and are fully commented to explain the features used. We recommend that you review these examples. You can use them as a starting point for developing backup, restore, and recovery scripts.



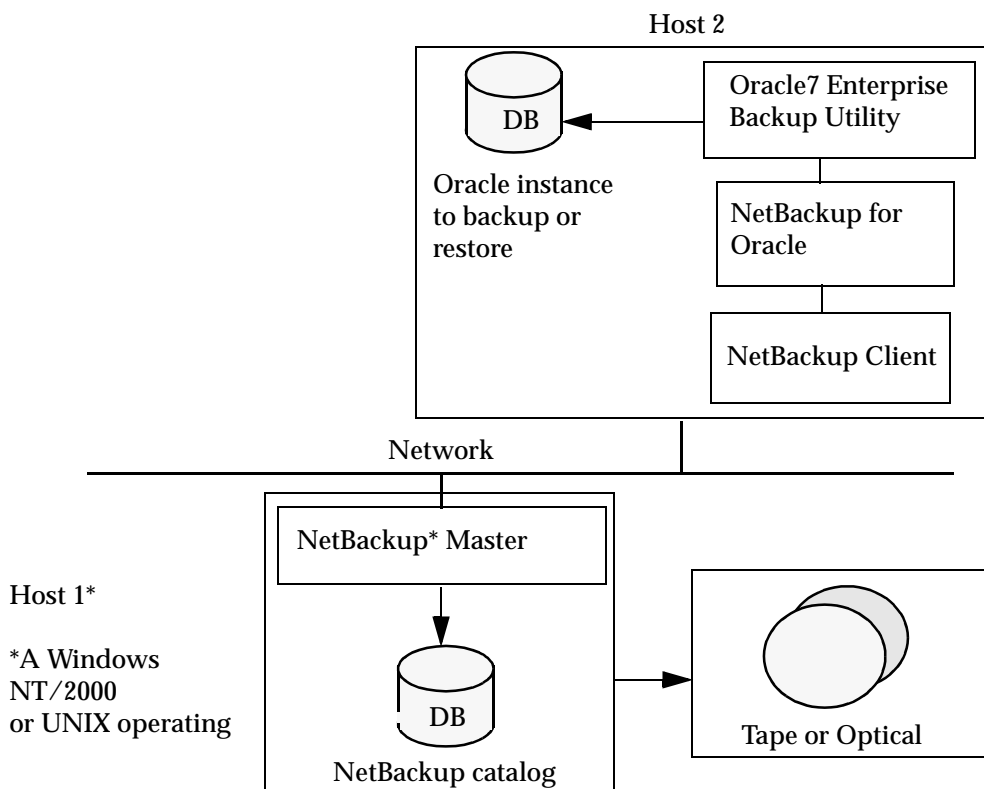
Technical Overview of NetBackup for Oracle on Windows

The example network below shows the major components in a NetBackup for Oracle configuration.

The storage devices are connected to the NetBackup master server. A NetBackup media server can access the storage devices through the master server. Both the master server and the media server must have NetBackup server software installed.

The host with the database must be a NetBackup client and have NetBackup for Oracle installed.

Oracle7 Enterprise Backup Utility



How Does the Oracle7 Enterprise Backup Utility Work?

During a backup or restore, the Oracle7 Enterprise Backup Utility provides the interface to the databases and performs the actual extraction and insertion of data.

To start a database backup or restore, the database administrator must execute a command called `ebu`. This command can be executed from the command line, a DOS script, or an application such as NetBackup. An EBU script is used as a parameter to the `ebu` command and defines the type of operation to be performed (for example, backup or restore). The EBU script also defines other components of the operation, such as the database objects to be backed up or restored.

During a backup or restore, the Oracle7 Enterprise Backup Utility controls the data streams going into or out of a database. This utility can access storage devices when it is integrated with a media management system, such as that provided by NetBackup and its Media Manager.

For more information, we recommend that you read the *Oracle7 Enterprise Backup Utility Administrator's Guide*.

How Does NetBackup for Oracle on Windows Work?

NetBackup for Oracle on Windows includes a library of functions that enable the Oracle7 Enterprise Backup Utility to use NetBackup with its Media Manager. The link to this library is created during an Oracle7 Enterprise Backup Utility installation.

NetBackup users or schedules start database backups by specifying a NetBackup for Oracle templates or shell script in the file list of the Oracle policy. The NetBackup for Oracle templates or shell script executes the `ebu` command with the EBU script as a parameter.

For a backup:

1. The `ebu` command, with the EBU script as a parameter, starts the requested operation on the databases.
2. When the process requires media to store backup data, `ebu` starts a user-directed backup by issuing a backup request.
3. The NetBackup master server connects to NetBackup for Oracle on the client and transfers the database data to secondary storage.

A restore works in essentially the same manner except that `ebu` issues a restore request. This causes NetBackup to retrieve the data from secondary storage and send it to NetBackup for Oracle on the client.

Since the Oracle7 Enterprise Backup Utility supports parallel operations, a single `ebu` execution can start more than one backup or restore on the NetBackup system.



The status for an `ebu` operation is stored in the Oracle7 Enterprise Backup Utility catalog. This is the same status that is indicated by the output from the script used to run the backup or restore. This is the only status that a database administrator must check to verify that a backup or restore has been successful.

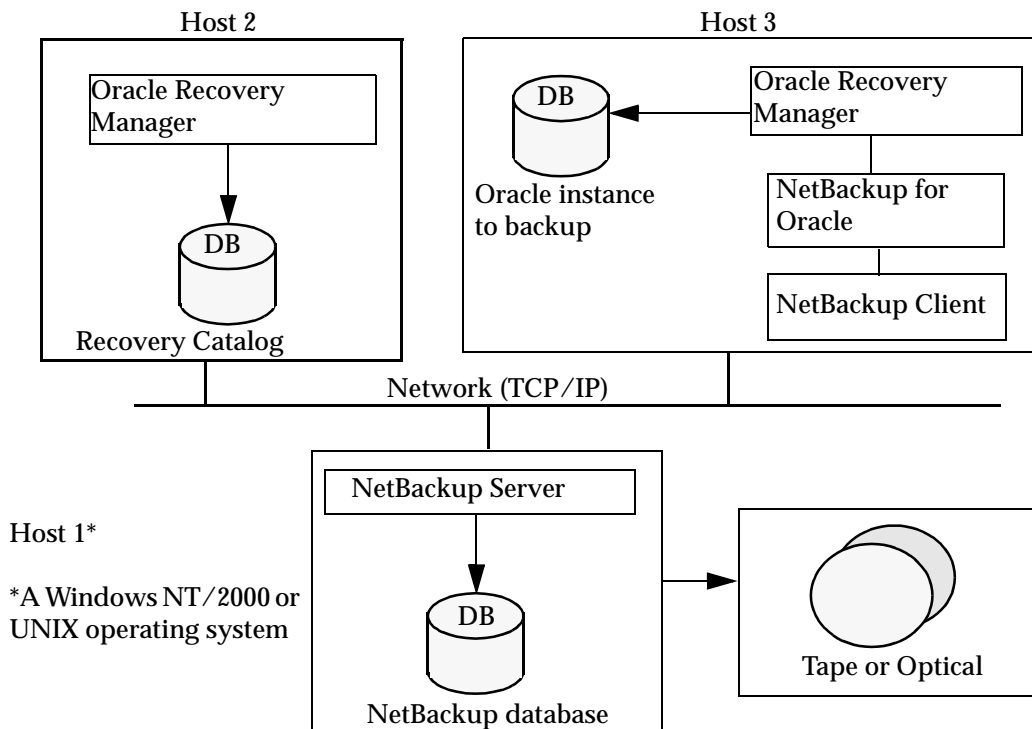
NetBackup also logs status, but only for its own part of the operation. The database administrator cannot use the NetBackup status to determine whether `ebu` was successful. Errors can occur in `ebu` that do not affect NetBackup and are not recorded in its logs.

Incremental Backup of Oracle Databases

The Oracle7 Enterprise Backup Utility does not provide true incremental backups. That is, rather than backing up just the modified data blocks, the utility backs up the entire datafile, regardless of when the file was updated. An online backup and its archived redo logs provide essentially the same protection as incrementals.

Refer to the *Oracle7 Server Administrator's Guide* and the *Oracle7 Enterprise Backup Utility Administrator's Guide* for more complete details on the backup and recovery process.

Oracle Recovery Manager



How Does the Oracle Recovery Manager Work?

The Oracle Recovery Manager (RMAN) performs a wide variety of automated backup and recovery functions. During backup or restore, RMAN provides the interface to the databases and performs the actual extraction and insertion of data.

To start a database backup or restore, the database administrator must execute a command called `rman`. This command can be executed from the command line, a DOS script, or an application such as NetBackup. The RMAN script is used as a parameter to the `rman` command and defines the commands to be performed (for example, backup or restore). The RMAN script also defines other components of the operation such as the database objects to be backed up or restored.

During a backup or restore, the Oracle Recovery Manager controls the data streams going into or out of a database. The Oracle Recovery Manager can access storage devices when it is integrated with a media management system, such as that provided by NetBackup and its Media Manager.



For more information, read the Oracle Backup and Recovery Guide.

How Does NetBackup for Oracle on Windows Work?

Following are prerequisites for performing backups to tape:

- ◆ Access to the NetBackup library
- ◆ Generating unique file names

NetBackup for Oracle on Windows includes a library of functions that enable the Oracle Recovery Manager to use NetBackup and its Media Manager. To provide access to this library, the `system32` folder must be on the system `PATH`.

When using the `backup` command, each resulting backup set contains at least one backup piece (datafile, datafile copy, control file, or archive log) from the target database. You must give each backup piece a unique name using the `format` operand. Several substitution variables are available to aid in generating unique names. You can specify the `format` operand in the `backup` command or in the `allocate channel` command. NetBackup considers the backup piece name as the file being backed up, so this name must be unique in the catalog. When an Oracle 8.0.x RMAN backup uses a file name that already exists in the catalog, the original backup having that name is deleted. In Oracle 8i or later, the RMAN backup will fail with a `file already exists in catalog error`.

For more information on generating unique file names, refer to the Oracle Backup and Recovery Guide.

NetBackup users or schedules start database backups by specifying a NetBackup for Oracle templates or shell script in the file list of the Oracle policy. The NetBackup for Oracle templates or shell script specifies the backup commands that Oracle Recovery Manager will perform on the client.

For a backup:

1. The `rman` command starts the requested operation on the databases.
2. When the process requires media to store backup data, RMAN starts a user-directed backup by issuing a backup request.
3. The NetBackup master server connects to NetBackup for Oracle on Windows on the client and transfers the database data to secondary storage.

A restore works in essentially the same manner except that RMAN issues a restore request. This causes NetBackup to retrieve the data from secondary storage and send it to NetBackup for Oracle on Windows on the client.

Since the Oracle Recovery Manager supports parallel operations, a single `rman` execution can start more than one backup or restore on the NetBackup system.

The status for an RMAN operation is stored in the Oracle Recovery Manager catalog or in the database control file. This is the same status that is indicated by the output of the script used to run the backup or restore. This is the only status that a database administrator must check to verify that a backup or restore has been successful.

NetBackup also logs status, but only for its own part of the operation. The database administrator cannot use the NetBackup status to determine whether `rman` was successful. Errors can occur in `rman` that do not affect NetBackup and are not recorded in its logs.

Incremental Backup of Oracle Databases

The Oracle Recovery Manager provides true incremental backups. An incremental backup will back up datafiles, which include only the blocks that have been changed since the last incremental.

Refer to the *Oracle Server Administrator's Guide* and the Oracle Backup and Recovery Guide for more complete details on the backup and recovery process.





This chapter explains how to install NetBackup for Oracle on Windows. It also contains sections on installing Oracle7 Enterprise Backup Utility and Oracle Recovery Catalog.

To determine which Oracle version levels are supported, refer to the Database Agent Matrix in the *NetBackup Release Notes*.



NetBackup Installation Procedure

Before installing NetBackup for Oracle on Windows, be sure to complete the following procedures:

- ◆ Install NetBackup server software on the server.

The NetBackup server platform can be any of those that NetBackup supports.

For a BusinessServer installation, refer to the *NetBackup BusinessServer Getting Started Guide - UNIX* or the *NetBackup BusinessServer Getting Started Guide for Windows* for details.

For a DataCenter installation, refer to the *NetBackup DataCenter Installation Guide - UNIX* or the *NetBackup DataCenter Installation Guide for Windows*.

- ◆ Install the NetBackup client software on the client where you will be backing up the databases.

See the *NetBackup Installation Guide - PC Clients* for installation instructions on Windows clients.

- ◆ Stop Oracle Services.

Now you are ready to install NetBackup for Oracle on Windows on the client where you will be backing up the databases. Refer to the next section for detailed instructions on installing NetBackup for Oracle on Windows.

Installing NetBackup for Oracle on Windows

The following is the procedure for installing NetBackup for Oracle on Windows.

Installation Requirements

- ◆ A valid license key for NetBackup for Oracle on Windows must be registered on the master or media server. License keys can be added from the NetBackup Administration Console. From the **Help** menu, choose **License Keys**.
- ◆ The version of the NetBackup Client and the version of NetBackup for Oracle on Windows must be the same (e.g., 4.5).

▼ To install NetBackup for Oracle on Windows:

1. Insert the NetBackup CD-ROM into the drive.
 - On systems with AutoPlay enabled for CD-ROM drives, the NetBackup install program starts automatically.
 - On Windows NT 4.0 or Windows 2000 systems that have AutoPlay disabled, run the `Launch.exe` program in the root directory on the CD-ROM.
2. Below the “Main Menu” on the left, click **Database Agents**.
3. Click **Database Agent Installation**.
4. Click **Oracle**.
5. Click **Next** and follow the prompts in the setup program.
6. Restart the Oracle services.



Install Oracle Recovery Catalog

The recovery catalog is a repository of information that is used and maintained by Oracle Recovery Manager. Oracle Recovery Manager uses the information in the recovery catalog to determine how to execute requested backup and restore actions.

The recovery catalog contains information about:

- ◆ Datafile and archivelog backup sets and backup pieces
- ◆ Datafile copies
- ◆ Archived redo logs and their copies
- ◆ Tablespaces and datafiles on the target database
- ◆ Stored scripts, which are named, user-created sequences of RMAN and SQL commands

Oracle recommends you use Oracle Recovery Manager with a recovery catalog, especially if you have 20 (or more) datafiles. However, you are not required to maintain a recovery catalog with Oracle Recovery Manager.

Because most information in the recovery catalog is also available in the target database's control file, Oracle Recovery Manager supports an operational mode where it uses the target database control file instead of a recovery catalog. This mode is appropriate for small databases where installation and administration of another database for the sole purpose of maintaining the recovery catalog would be burdensome.

If a recovery catalog is not used, the following features are not supported:

- ◆ Tablespace point-in-time recovery
- ◆ Stored scripts
- ◆ Restore and recovery when the control file is lost or damaged

Because recovery catalog installation procedures are version specific, refer to your Oracle Backup and Recovery Guide for details.

Before attempting to configure NetBackup for Oracle on Windows, complete the installation procedure as described in the Installation chapter.

The following is the configuration procedure.

1. Configuring the Media Manager
2. Setting the Maximum Jobs per Client Global Attribute
3. Configuring a NetBackup Policy
4. Configuring the Run-Time Environment
5. Creating Templates and Shell Scripts
6. Database User Authentication and Server-Directed Backups
7. Testing NetBackup for Oracle on Windows Configuration Settings.

The following sections in this chapter describe each of these steps in detail.

To configure NetBackup for Oracle on Windows from a Windows NetBackup server, see “Configuration Using the NetBackup Administration Console for Windows” on page 22.

To configure NetBackup for Oracle on Windows from a UNIX NetBackup server, see “Configuration Using the NetBackup Administration Console for UNIX” on page 36.



Configuration Using the NetBackup Administration Console for Windows

Although the database agent is installed on the NetBackup client, some configuration procedures are performed using the NetBackup Administration Console on the server.

These procedures include:

- ◆ Configuring the Media Manager
- ◆ Setting the Maximum Jobs per Client global attribute
- ◆ Configuring a NetBackup policy
- ◆ Testing NetBackup for Oracle on Windows configuration settings

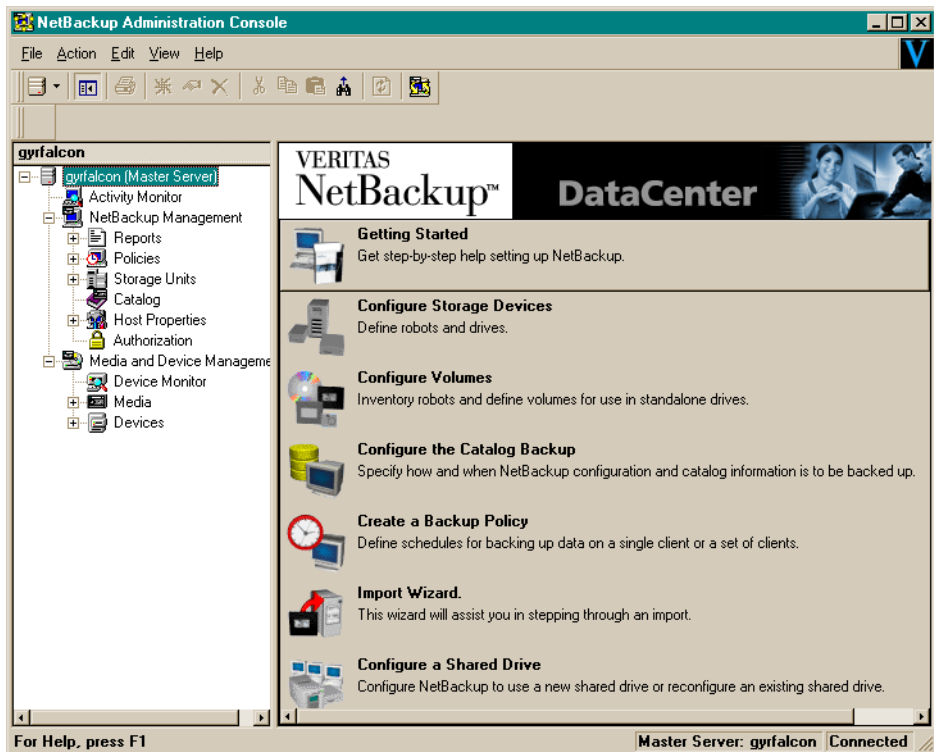
See the next section for instructions on starting the NetBackup Administration Console.

▼ To launch the NetBackup Administration Console for Windows

1. Log on to the server as administrator.
2. From the Windows **Start** menu, point to **Programs**, point to **VERITAS NetBackup** and click **NetBackup Administration Console**.

The NetBackup Administration Console appears.





Configuring the Media Manager

Use the Media Manager to configure tapes or other storage units for a NetBackup for Oracle on Windows configuration.

- ◆ Refer to the *Media Manager for NetBackup System Administrator's Guide for UNIX* if the NetBackup server is UNIX.
- ◆ Refer to the *Media Manager for NetBackup System Administrator's Guide for Windows* if the NetBackup server is Windows.

The number of volumes required will depend on the devices used, the size of the Oracle databases that you are backing up, and the frequency of backups.

Setting the Maximum Jobs per Client Global Attribute

The **Maximum jobs per client** attribute value is figured with the following formula.



$$\text{Max Jobs per Client} = \text{Number of Streams} \times \text{Number of Policies}$$

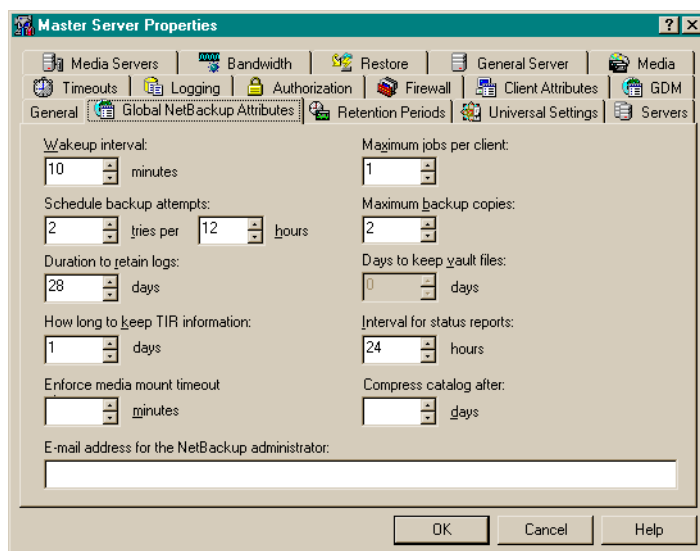
Where:

- ◆ *Number of Streams* is the number of backup streams between the database server and NetBackup. Each separate stream starts a new backup job on the client.
- ◆ *Number of Policies* is the number of policies that may back up this client at the same time. This number can be greater than one. For example, a client may be in two policies in order to back up two different databases. These backup windows may overlap.

To avoid any problems, we recommend that you enter a value of 99 for the **Maximum jobs per client** global attribute.

▼ To set the Maximum jobs per client attribute on a Windows server

1. In the left pane of the NetBackup Administration Console, expand **Host Properties**. Select **Master Server**.
2. In the right pane, double-click on the server icon.
The Master Server Properties dialog box appears.
3. In the Master Server Properties dialog box, click the **Global NetBackup Attributes** tab.



The default value is 1 for **Maximum jobs per client**.

4. Change the **Maximum jobs per client** value to a value equal to the maximum number of backups allowed per client.

Tip To avoid any problems, we recommend that you enter a value of 99 for the **Maximum jobs per client** global attribute.

Configuring a NetBackup Policy

A NetBackup policy defines the backup criteria for a specific group of one or more clients. These criteria include:

- ◆ storage unit and media to use
- ◆ backup schedules
- ◆ backup templates or shell script files to be executed on the clients
- ◆ clients to be backed up

To use NetBackup for Oracle on Windows, at least one Oracle policy with the appropriate schedules needs to be defined. A configuration can have a single policy that includes all clients or there can be many policies, some of which include only one client.

Most requirements for Oracle policies are the same as for file system backups. In addition to the attributes described here, there are other attributes for a policy to consider. Refer to the *NetBackup System Administrator's Guide* for detailed configuration instructions and information on all the attributes available.

Adding New Policies

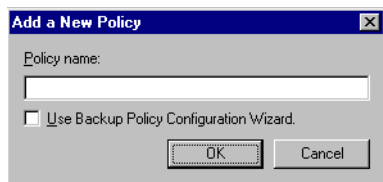
Use this procedure when configuring a policy from a Windows server or from a NetBackup Remote Administration Console host.

▼ To add a new policy

1. Log on to the server as administrator.
2. Start the NetBackup Administration Console.
3. If your site has more than one master server, choose the one where you want to add the policy.
4. In the left pane, right-click **Policies**. From the menu, select **New Policy**.

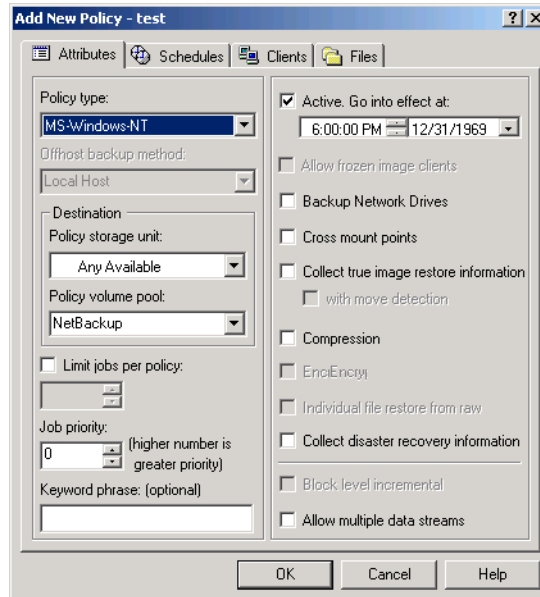


The Add a New Policy dialog box appears.



- a. In the **Policy name** box, type a unique name for the new policy.
 - b. Choose whether to use the wizard for configuring the policy. The wizard guides you through the setup process and simplifies it by automatically choosing default values that are good for most configurations. If necessary, you can change the defaults later by editing the policy.
 - To use the wizard, select the **Use Backup Policy Configuration Wizard** box and click **OK**. The wizard starts and you create the policy by following the prompts. When prompted, select the Oracle policy type.
 - If you require more control over the settings than the wizard provides, then do not select the **Use Backup Policy Configuration Wizard** box and proceed to step 5.
5. Click **OK**.

A dialog box appears in which you can specify the general attributes for the policy.



6. From the **Policy Type** box, select the Oracle policy type.
7. Complete the entries on the **Attributes** tab as explained in “Description of Attributes.”
8. Add other policy information:
 - To add schedules, see “Adding New Schedules.”
 - To add templates or shell scripts, see “Specifying the List of Scripts.”
 - To add clients, see “Adding Clients to a Policy.”
9. Click **OK**. The new policy will be created.

Description of Attributes

With a few exceptions, NetBackup manages a database backup like a file system backup. Policy attributes that are different for Oracle backups are explained below.



Your other policy attributes will vary according to your specific backup strategy and system configuration. Consult the *NetBackup System Administrator's Guide* for detailed explanations of the policy attributes.

Attribute	Description
Policy type	Determines the type of clients that can be in the policy and in some cases the types of backups that can be performed on those clients. To use NetBackup for Oracle on Windows, you must have defined at least one Oracle policy.
Keyword phrase	For NetBackup for Oracle on Windows, the keyword phrase entry is ignored.

Adding New Schedules

Each policy has its own set of schedules. These schedules control initiation of automatic backups and also specify when user operations can be initiated.

An Oracle backup requires at least two specific schedule types: an Application Backup schedule and an Automatic Backup schedule. You can also create additional schedules.

The following procedures explain how to configure the required schedule types, and how to add other new schedules.

▼ To configure an Application Backup schedule

1. Double-click on the schedule named **Default-Application-Backup**.

All Oracle database operations are performed through NetBackup for Oracle on Windows using an Application Backup schedule. This includes those backups started automatically.

You must configure an Application Backup schedule for each Oracle policy you create. If you do not do this, you will not be able to perform a backup. To help satisfy this requirement, an Application Backup schedule named **Default-Application-Backup** is automatically created when you configure a new Oracle policy.

2. Specify the other properties for the schedule as explained in "Schedule Properties."

The backup window for an Application Backup schedule must encompass the time period during which all NetBackup jobs, scheduled and unscheduled, will occur. This is necessary because the Application Backup schedule starts processes that are required for all NetBackup for Oracle on Windows backups, including those started automatically.

For example, assume that you:

- expect users to perform NetBackup operations during business hours, 0800 to 1300.
- configured automatic backups to start between 1800 and 2200.

The Application Backup schedule must have a start time of 0800 and a duration of 14 hours.

Example Settings for an Application Backup schedule.

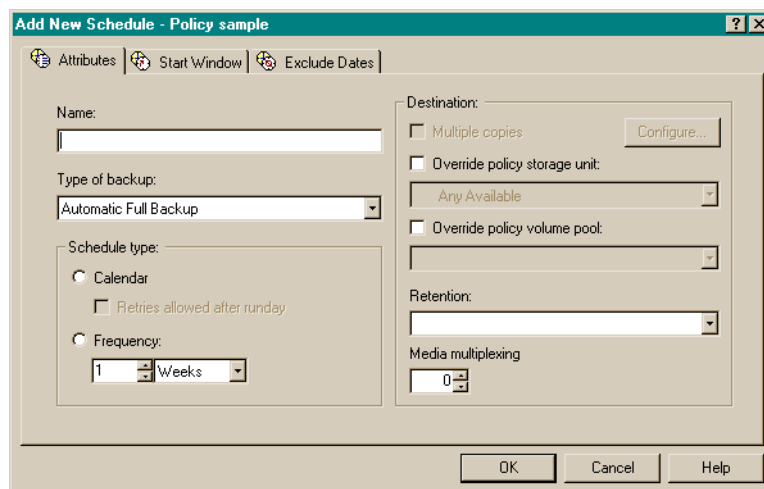
Type of Backup	Schedule settings	Description	Settings
Application Backup	Retention	The length of time backup images are stored.	2 weeks
	Backup Window	The time during which a NetBackup operation can be performed.	Sunday through Saturday 00:00:01 - 23:59:59

Tip Set the time period for the Application Backup schedule for 24 hours per day, seven days per week. This will ensure that your NetBackup for Oracle on Windows operations are never locked out due to the Application Backup schedule.

▼ To configure an automatic backup schedule

1. In the left pane, right-click on the name of the policy and select **New Schedule** from the menu.

The Add New Schedule dialog box appears. The title bar shows the name of the policy to which you are adding the schedules.



2. Specify a unique name for the schedule.

3. Select the **Type of Backup**.

For information on the types of backups available for this policy, see “Types of Backups.”

Refer to the following tables for recommended settings for an Automatic Backup schedule

Type of Backup	Schedule settings	Description	Settings
Automatic Full Backup	Retention	The length of time to store the record of a backup.	2 weeks
	Frequency	Frequency determines how often a backup should be performed	every week
	Backup Window	The time during which a NetBackup operation can be performed.	Sunday, 18:00:00 - 22:00:00
Automatic Differential Incremental Backup	Retention	The length of time to store the record of a backup.	1 week
	Frequency	Frequency determines how often a backup should be performed	every day
	Backup Window	The time during which a NetBackup operation can be performed.	Sunday through Saturday 18:00:00 - 22:00:00
Automatic Cumulative Incremental Backup	Retention	The length of time to store the record of a backup.	1 week
	Frequency	Frequency determines how often a backup should be performed	every day
	Backup Window	The time during which a NetBackup operation can be performed.	Sunday through Saturday 18:00:00 - 22:00:00

4. Specify the other properties for the schedule as explained in “Schedule Properties.”

When a schedule is executed, NetBackup sets environment variables based on which type of automatic backup schedule is selected. These environment variables can then be used to conditionally start a backup. Refer to “Environment Variables Set Up by NetBackup for Oracle” on page 52.

5. To add other schedules, repeat Step 1 through Step 4.



Types of Backups

Application Backup	The Application Backup schedule enables user-controlled NetBackup operations performed on the client. At least one Application Backup schedule type must be configured for each Oracle policy. The Default-Application-Backup schedule is automatically configured as an Application Backup schedule.
Automatic Full Backup	A full backup copies all blocks into the backup set, skipping only datafile blocks that have never been used.
Automatic Differential Incremental Backup	In a differential level n incremental backup, you back up all blocks that have changed since the most recent backup at level n or lower. For example, in a differential level 2 backup, you back up all blocks modified since the last level 2, level 1, or level 0 backup. Incremental backups are differential by default.
Automatic Cumulative Incremental Backup	<p>In a cumulative level n incremental backup, you back up all blocks that have changed since the most recent backup at level n-1 or lower. For example, in a cumulative level 2 backup, you back up all blocks changed since the most recent level 1 or level 0 backup.</p> <p>Cumulative incremental backups reduce the work needed for a restore by ensuring that you only need one incremental backup from any particular level at restore time. Cumulative backups require more space and time than Differential Incremental Backups, however, because they duplicate the work done by previous backups at the same level.</p>

Schedule Properties

Some of the schedule properties have a different meaning for database backups than for a regular file system backup. These properties are explained below.

Other schedule properties will vary according to your specific backup strategy and system configuration. Consult the *NetBackup System Administrator's Guide* for detailed explanations of the schedule properties.

Property	Description
Type of backup	Specifies the type of backup that this schedule will control. The selection list shows only the backup types that apply to the policy you are configuring. For more information see "Types of Backups."



Property	Description
Frequency	This setting is used only for scheduled backups, and not for user-directed backups. Frequency specifies the period of time that will elapse until the next backup operation can begin on this schedule. For example, if the frequency is seven days and a successful backup occurs on Wednesday, the next full backup will not occur until the following Wednesday. Normally, incremental backups will have a shorter frequency than full backups.
Calendar	This setting is used only for scheduled backups, and not for user-directed backups. The Calendar option allows you to schedule backup operations based on specific dates, recurring week days, or recurring days of the month.
Retention	Frequency based scheduling <p>The retention period for an <i>Application Backup</i> schedule refers to the length of time that NetBackup keeps backup images.</p> <p>The retention period for an Automatic Full Backup, Automatic Differential Incremental Backup, or Automatic Cumulative Incremental Backup schedule controls how long NetBackup keeps records of when scheduled backups have occurred.</p> <p>The NetBackup scheduler compares the latest record to the frequency to determine whether a backup is due. This means that if you set the retention period to expire the record too early, the scheduled backup frequency will be unpredictable. However, if you set the retention period to be longer than necessary, the NetBackup catalog will accumulate unnecessary records. <i>Therefore, set a retention period that is <u>longer</u> than the frequency setting for the schedule.</i></p> <p>For example, if the frequency setting is set to one week, set the retention period to be more than one week.</p> <p>Note Oracle is not notified when NetBackup expires a backup image. You must use Oracle RMAN repository maintenance commands to periodically delete expired backup sets from the Oracle RMAN repository.</p> Calendar based scheduling <p>The retention period for an <i>Application Backup</i> schedule refers to the length of time that NetBackup keeps backup images.</p> <p>The retention period for an Automatic Full Backup, Automatic Differential Incremental Backup, or Automatic Cumulative Incremental Backup schedule controls how long NetBackup keeps records of when scheduled backups have occurred. However, this setting is not significant for calendar based scheduling.</p>
Multiple copies	If you are licensed for the Inline Tape Copy feature and wish to specify multiple copies for your Oracle policy, configure Multiple copies on the Application Backup schedule.

Expiration of Backup Files

NetBackup and Oracle each maintain a repository for backup image information. Currently, automatic expiration of backup images from both repositories is not supported.

The following describes how to expire images and synchronize the NetBackup and the Oracle repositories.

Expiration of Backup Images from the NetBackup Repository Using Retention Level.

NetBackup automatically controls the expiration of the Oracle backup images from its repository using the retention setting in an Application Backup schedule.

Use the retention setting to specify the length of time before NetBackup expires a backup image. Note that the retention setting has a slightly different meaning for an Application Backup schedule and an automatic backup schedule. See “Schedule Properties” for more details.

When you use the retention setting to expire backup images, you must perform periodic Oracle repository maintenance to remove references to expired backup files.

Oracle7 Enterprise Backup Utility Repository Maintenance. Manually remove references to backup images from the Oracle repository. Use the `ebutool` utility or the `invalidate` script command to delete successfully completed jobs. Any of these methods deletes Backup File Set information from both the Oracle7 Enterprise Backup Utility repository and the NetBackup repository.

When a request is issued to delete a backup file from the EBU repository, it sends the request to NetBackup for Oracle to delete the corresponding image from the NetBackup repository regardless of the retention level.

Oracle Recovery Manager Repository Maintenance. Manually remove references to backup images from the Oracle RMAN repository. Use RMAN repository maintenance commands to remove references to backup files. You can use these commands to delete backup image information from both the Oracle RMAN repository and the NetBackup repository. For more information on the RMAN repository maintenance commands, refer to “Maintaining the RMAN Repository” on page 74.

When a request is issued to delete a backup file from the RMAN repository, RMAN sends the request to NetBackup for Oracle to delete the corresponding image from the NetBackup repository, regardless of the retention level.

Specifying the List of Scripts

The Scripts list in a database policy has a different meaning than the File list has for other policies. Normally, in a Windows policy, you would list files and folders to be backed up. But since you are now configuring a database policy, you will list templates or scripts.



For a discussion of NetBackup for Oracle templates and shell scripts, see “Creating Templates and Shell Scripts” on page 55.

Add templates or shell scripts only if you are setting up a policy for automatic scheduling. All templates or shell scripts listed in the Scripts list will be executed for the Automatic Full Backup, Automatic Differential Incremental Backup, or Automatic Cumulative Incremental Backup schedules as specified under the **Schedules** tab.

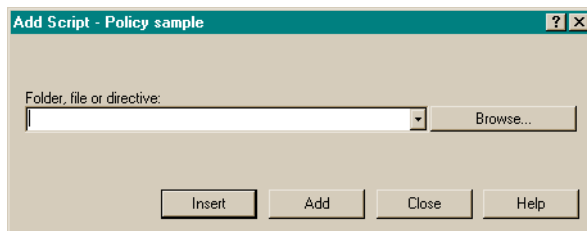
All templates or shell scripts specified in the Scripts list are executed during manual or automatic backups. NetBackup will start backups by running the templates or shell scripts in the order that they appear in the Scripts list.

▼ **To add templates or shell scripts to the Scripts List**

Caution Be sure to use the correct NetBackup for Oracle templates or shell script name in the file list to prevent an error or possibly a wrong operation.

1. In the left pane of the NetBackup Administration Console, right-click on the policy name and click **New Script**.

A dialog box appears. The title bar shows the name of the policy to which you are adding the templates or shell scripts.



Note Do not use the **Browse** option if you are listing RMAN templates. Selecting via **Browse** will provide a full path, which works for shell scripts but not for templates.

2. Type the name of the NetBackup for Oracle template or shell script.

Shell scripts:

Be sure to specify the full pathname when listing shell scripts. For example:

```
install_path\NetBackup\dbext\oracle\samples\rman\cold_database_backup.cmd
```

Be sure that the shell scripts listed here are installed on each client in the Client list.

Templates:

Since templates are stored in a known location on the master server, only the template file name should be entered. For example:

```
weekly_full_backup.tpl
```

3. Click Add.

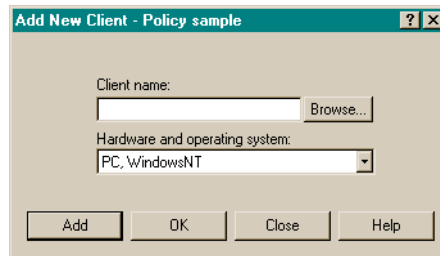
Adding Clients to a Policy

The client list is the list of clients on which your NetBackup for Oracle templates or shell scripts will be executed during an automatic backup. A NetBackup client must be in at least one policy but can be in more than one.

▼ To add clients to a policy

1. In the left pane of the NetBackup Administration Console, right-click on the policy name and click **New Client**.

The Add New Client dialog box appears. The title bar shows the name of the policy to which you are adding the clients.



2. In the **Client name** text box, type the name of the client that you are adding.
On the client the following should be installed:
 - Oracle
 - NetBackup client or server
 - NetBackup for Oracle on Windows
 - the backup shell script(s) (unless you are using templates)
3. Choose the hardware and operating system type.
4. Click **Add**.
5. To add another client, repeat step 2 through step 4. If this is the last client, click **Close** to close the dialog box.



Configuration Using the NetBackup Administration Console for UNIX

Although the database agent is installed on the NetBackup client, some configuration procedures are performed using the NetBackup Administration Console on the server.

These procedures include:

- ◆ Configuring the Media Manager
- ◆ Setting the Maximum Jobs per Client global attribute
- ◆ Configuring a NetBackup policy
- ◆ Testing NetBackup for Oracle on Windows configuration settings

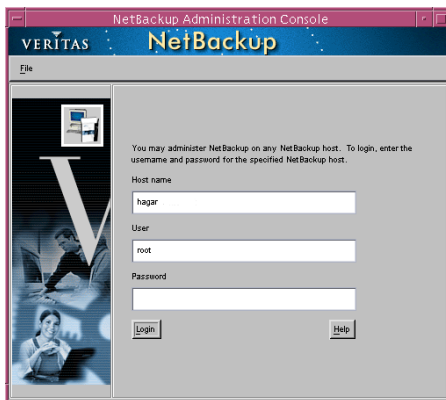
See the next section for instructions on starting the NetBackup Administration Console.

▼ To launch the NetBackup Administration Console for UNIX

1. Log onto the UNIX server as root.
2. Start the NetBackup Administration Console by executing:

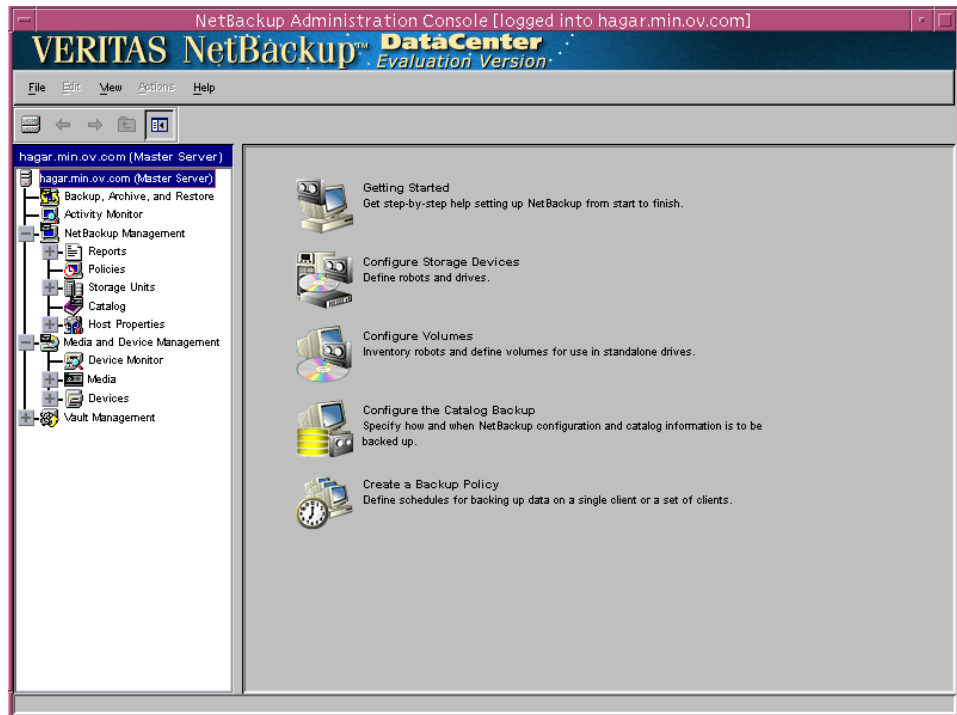
install_path/netbackup/bin/jnbSA &

The Login dialog box appears.



3. Type the name of the master server where you initially want to manage NetBackup. You can specify any NetBackup master server. Indicate the User and Password.

4. Click **Login**. The NetBackup Administration Console appears.



Configuring the Media Manager

Use the Media Manager to configure tapes or other storage units for a NetBackup for Oracle on Windows configuration.

- ◆ Refer to the *Media Manager for NetBackup System Administrator's Guide for UNIX* if the NetBackup server is UNIX.
- ◆ Refer to the *Media Manager for NetBackup System Administrator's Guide for Windows* if the NetBackup server is Windows.

The number of volumes required will depend on the devices used, the size of the Oracle databases that you are backing up, and the frequency of backups.

Setting the Maximum Jobs per Client Global Attribute

The **Maximum jobs per client** attribute value is figured with the following formula.



$\text{Max Jobs per Client} = \text{Number of Streams} \times \text{Number of Policies}$

Where:

- ◆ *Number of Streams* is the number of backup streams between the database server and NetBackup. Each separate stream starts a new backup job on the client.
- ◆ *Number of Policies* is the number of policies that may back up this client at the same time. This number can be greater than one. For example, a client may be in two policies in order to back up two different databases. These backup windows may overlap.

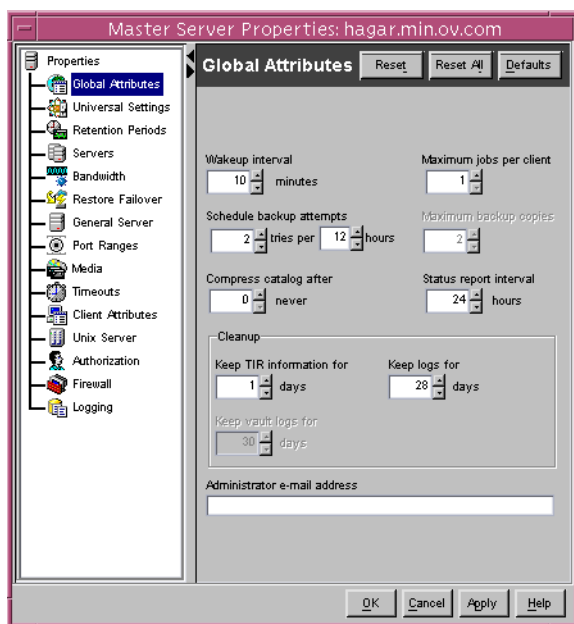
To avoid any problems, we recommend that you enter a value of 99 for the **Maximum jobs per client** global attribute.

▼ To set the Maximum jobs per client attribute on a UNIX server

Use this procedure to set the **Maximum jobs per client** global attribute using the NetBackup Administration Console - Java interface on a Java-capable platform.

1. In the left pane of the NetBackup Administration Console, expand **Host Properties**. Select **Master Servers**.
2. In the right pane, double-click on the server icon. Click **Global Attributes**.

The Master Server Properties dialog box appears.



The default value is 1 for **Maximum jobs per client**.

3. Change the **Maximum jobs per client** value to a value equal to the maximum number of backups allowed per client.

Tip To avoid any problems, we recommend that you enter a value of 99 for the **Maximum jobs per client** global attribute.

Configuring a NetBackup Policy

A NetBackup policy defines the backup criteria for a specific group of one or more clients. These criteria include:

- ◆ storage unit and media to use
- ◆ backup schedules
- ◆ backup templates or shell script files to be executed on the clients
- ◆ clients to be backed up

To use NetBackup for Oracle on Windows, at least one Oracle policy with the appropriate schedules needs to be defined. A configuration can have a single policy that includes all clients or there can be many policies, some of which include only one client.

Most requirements for Oracle policies are the same as for file system backups. In addition to the attributes described here, there are other attributes for a policy to consider. Refer to the *NetBackup System Administrator's Guide* for detailed configuration instructions and information on all the attributes available.

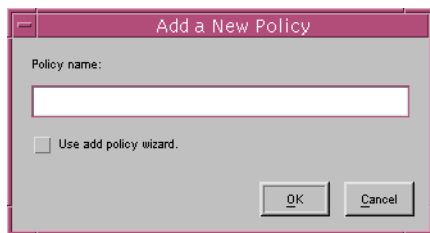
Use this procedure when configuring a policy from a UNIX server.

▼ To add a new policy

1. Log onto the server as root.
2. Start the NetBackup Administration Console.
3. If your site has more than one master server, choose the one to which you want to add the policy.
4. In the left pane, click on **Policies**. The right pane splits into a All Policies pane and a details pane.
5. In the All Policies pane, right-click on the Master Server, and click **New**.

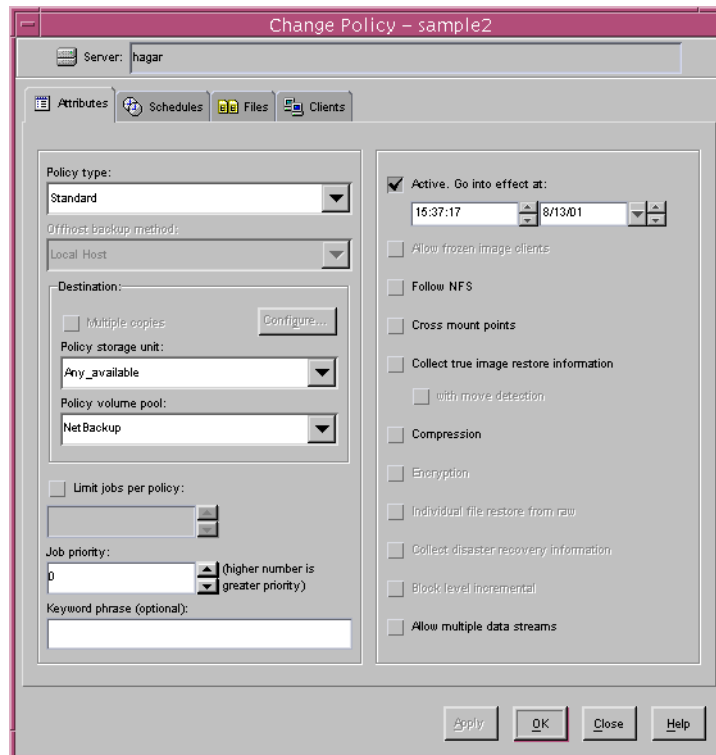


The Add a New Policy dialog box appears.



- a. In the **Policy name** box, type a unique name for the new policy.
 - b. Choose whether to use the wizard for configuring the policy. The wizard guides you through the setup process and simplifies it by automatically choosing default values that are good for most configurations. If necessary, you can change the defaults later by editing the policy.
 - To use the wizard, select the **Use add policy wizard** box and click **OK**. The wizard starts and you create the policy by following the prompts. When prompted, select the Oracle policy type.
 - If you require more control over the settings than the wizard provides, do not select the **Use add policy wizard** box and proceed to step 6.
6. Click **OK**.

A dialog box appears in which you can specify the general attributes for the policy.



7. From the **Policy type** box, select the Oracle policy type.
8. Complete the entries on the **Attributes** tab as explained in “Description of Attributes” and click **Apply** to save the attribute entries.
9. Add other policy information:
 - To add schedules, see “Adding New Schedules.”
 - To add templates or shell scripts, see “Specifying the List of Scripts.”
 - To add clients, see “Adding Clients to a Policy.”

Description of Attributes

With a few exceptions, NetBackup manages a database backup like a file system backup. Policy attributes that are different for Oracle backups are explained below.



Your other policy attributes will vary according to your specific backup strategy and system configuration. Consult the *NetBackup System Administrator's Guide* for detailed explanations of the policy attributes.

Attribute	Description
Policy type	Determines the type of clients that can be in the policy and in some cases the types of backups that can be performed on those clients. To use NetBackup for Oracle on Windows, you must have defined at least one Oracle policy.
Keyword phrase	For NetBackup for Oracle on Windows, the keyword phrase entry is ignored.

Adding New Schedules

Each policy has its own set of schedules. These schedules control initiation of automatic backups and also specify when user operations can be initiated.

A Oracle backup requires at least two specific schedule types: an Application Backup schedule and an Automatic Backup schedule. You can also create additional schedules.

The following procedures explain how to configure the required schedule types, and how to add other new schedules.

▼ To configure an Application Backup schedule

1. Under the policy name, select **Schedules**.
2. In the right pane, double-click on the schedule named **Default-Application-Backup**.

A dialog box appears. The title bar shows the name of the policy to which you are adding the schedule.

All Oracle database operations are performed through NetBackup for Oracle on Windows using an Application Backup schedule. This includes those backups started automatically.

You must configure an Application Backup schedule for each Oracle policy you create. If you do not do this, you will not be able to perform a backup. To help satisfy this requirement, an Application Backup schedule named Default-Application-Backup is automatically created when you configure a new Oracle policy.

3. Specify the other properties for the schedule as explained in “Schedule Properties.”

The backup window for an Application Backup schedule must encompass the time period during which all NetBackup jobs, scheduled and unscheduled, will occur. This is necessary because the Application Backup schedule starts processes that are required for all NetBackup for Oracle on Windows backups, including those started automatically.

For example, assume that you:

- expect users to perform NetBackup operations during business hours, 0800 to 1300.
- configured automatic backups to start between 1800 and 2200.

The Application Backup schedule must have a start time of 0800 and a duration of 14 hours.

Tip Set the time period for the Application Backup schedule for 24 hours per day, seven days per week. This will ensure that your NetBackup for Oracle on Windows operations are never locked out due to the Application Backup schedule.

Example Settings for an Application Backup schedule.

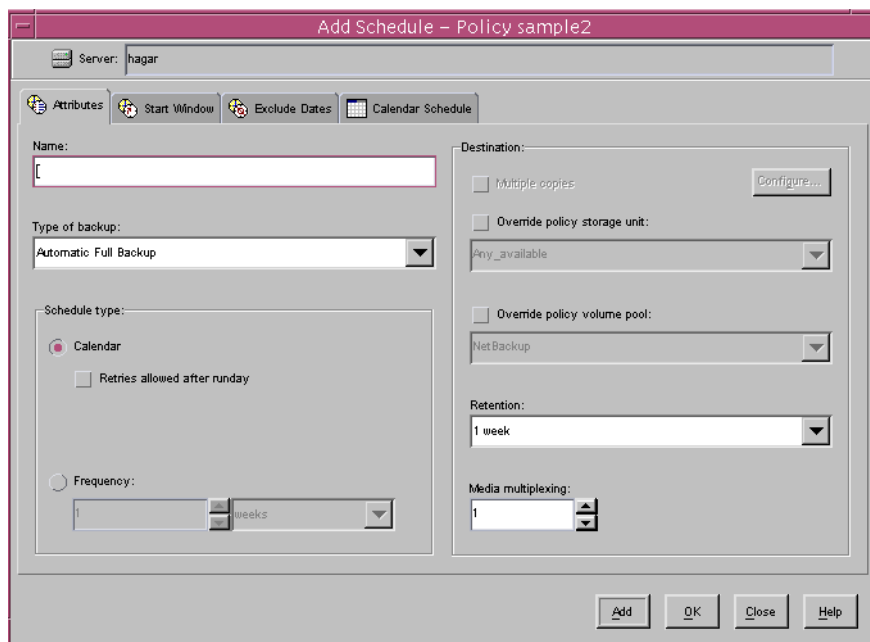
Type of Backup	Schedule settings	Description	Settings
Application Backup	Retention	The length of time backup images are stored.	2 weeks
	Backup Window	The time during which a NetBackup operation can be performed.	Sunday through Saturday 00:00:01 - 23:59:59



▼ **To configure an automatic backup schedule**

1. In the All Policies pane, expand the policy you wish to configure. Right-click **Schedules** and choose **New**.

A dialog box appears. The title bar shows the name of the policy to which you are adding the schedules.



2. Specify a unique name for the schedule.
3. Select the **Type of Backup**.

For information on the types of backups available for this policy, see “Types of Backups.”

Refer to the following tables for recommended settings for an Automatic Backup schedule.

Type of Backup	Schedule settings	Description	Settings
Automatic Full Backup	Retention	The length of time to store the record of a backup.	2 weeks
	Frequency	Frequency determines how often a backup should be performed	every week
	Backup Window	The time during which a NetBackup operation can be performed.	Sunday, 18:00:00 - 22:00:00
Automatic Differential Incremental Backup	Retention	The length of time to store the record of a backup.	1 week
	Frequency	Frequency determines how often a backup should be performed	every day
	Backup Window	The time during which a NetBackup operation can be performed.	Sunday through Saturday 18:00:00 - 22:00:00
Automatic Cumulative Incremental Backup	Retention	The length of time to store the record of a backup.	1 week
	Frequency	Frequency determines how often a backup should be performed	every day
	Backup Window	The time during which a NetBackup operation can be performed.	Sunday through Saturday 18:00:00 - 22:00:00

4. Specify the other properties for the schedule as explained in “Schedule Properties.”

When a schedule is executed, NetBackup sets environment variables based on which type of automatic backup schedule is selected. These environment variables can then be used to conditionally start a backup. Refer to “Environment Variables Set Up by NetBackup for Oracle” on page 52.

To add other schedules, repeat step 1 through step 4.



Types of Backups

Application Backup	The Application Backup schedule enables user-controlled NetBackup operations performed on the client. At least one Application Backup schedule type must be configured for each Oracle policy. The Default-Application-Backup schedule is automatically configured as an Application Backup schedule.
Automatic Full Backup	A full backup copies all blocks into the backup set, skipping only datafile blocks that have never been used.
Automatic Differential Incremental Backup	In a differential level n incremental backup, you back up all blocks that have changed since the most recent backup at level n or lower. For example, in a differential level 2 backup, you back up all blocks modified since the last level 2, level 1, or level 0 backup. Incremental backups are differential by default.
Automatic Cumulative Incremental Backup	<p>In a cumulative level n incremental backup, you back up all blocks that have changed since the most recent backup at level n-1 or lower. For example, in a cumulative level 2 backup, you back up all blocks changed since the most recent level 1 or level 0 backup.</p> <p>Cumulative incremental backups reduce the work needed for a restore by ensuring that you only need one incremental backup from any particular level at restore time. Cumulative backups require more space and time than Differential Incremental Backups, however, because they duplicate the work done by previous backups at the same level.</p>

Schedule Properties

Some of the schedule properties have a different meaning for database backups than for a regular file system backup. These properties are explained below.

Other schedule properties will vary according to your specific backup strategy and system configuration. Consult the *NetBackup System Administrator's Guide* for detailed explanations of the schedule properties.

Property	Description
Type of backup	Specifies the type of backup that this schedule will control. The selection list shows only the backup types that apply to the policy you are configuring. For more information see "Types of Backups."

Property	Description
Frequency	This setting is used only for scheduled backups, and not for user-directed backups. Frequency specifies the period of time that will elapse until the next backup operation can begin on this schedule. For example, if the frequency is seven days and a successful backup occurs on Wednesday, the next full backup will not occur until the following Wednesday. Normally, incremental backups will have a shorter frequency than full backups.
Calendar	This setting is used only for scheduled backups, and not for user-directed backups. The Calendar option allows you to schedule backup operations based on specific dates, recurring week days, or recurring days of the month.
Retention	<p>Frequency based scheduling</p> <p>The retention period for an <i>Application Backup</i> schedule refers to the length of time that NetBackup keeps backup images.</p> <p>The retention period for an Automatic Full Backup, Automatic Differential Incremental Backup, or Automatic Cumulative Incremental Backup schedule controls how long NetBackup keeps records of when scheduled backups have occurred.</p> <p>The NetBackup scheduler compares the latest record to the frequency to determine whether a backup is due. This means that if you set the retention period to expire the record too early, the scheduled backup frequency will be unpredictable. However, if you set the retention period to be longer than necessary, the NetBackup catalog will accumulate unnecessary records. <i>Therefore, set a retention period that is <u>longer</u> than the frequency setting for the schedule.</i></p> <p>For example, if the frequency setting is set to one week, set the retention period to be more than one week.</p> <p>Note Oracle is not notified when NetBackup expires a backup image. You must use Oracle RMAN repository maintenance commands to periodically delete expired backup sets from the Oracle RMAN repository.</p> <p>Calendar based scheduling</p> <p>The retention period for an <i>Application Backup</i> schedule refers to the length of time that NetBackup keeps backup images.</p> <p>The retention period for an Automatic Full Backup, Automatic Differential Incremental Backup, or Automatic Cumulative Incremental Backup schedule controls how long NetBackup keeps records of when scheduled backups have occurred. However, this setting is not significant for calendar based scheduling.</p>
Multiple copies	If you are licensed for the Inline Tape Copy feature and wish to specify multiple copies for your Oracle policy, configure Multiple copies on the Application Backup schedule.



Expiration of Backup Files

NetBackup and Oracle each maintain a repository for backup image information. Currently, automatic expiration of backup images from both repositories is not supported.

The following describes how to expire images and synchronize the NetBackup and the Oracle repositories.

Expiration of Backup Images from the NetBackup Repository Using Retention Level.

NetBackup automatically controls the expiration of the Oracle backup images from its repository using the retention setting in an Application Backup schedule.

Use the retention setting to specify the length of time before NetBackup expires a backup image. Note that the retention setting has a slightly different meaning for an Application Backup schedule and an automatic backup schedule. See “Schedule Properties” for more details.

When you use the retention setting to expire backup images, you must perform periodic Oracle repository maintenance to remove references to expired backup files.

Oracle7 Enterprise Backup Utility Repository Maintenance. Manually remove references to backup images from the Oracle repository. Use the `ebutool` utility or the `invalidate` script command to delete successfully completed jobs. Any of these methods deletes Backup File Set information from both the Oracle7 Enterprise Backup Utility repository and the NetBackup repository.

When a request is issued to delete a backup file from the EBU repository, it sends the request to NetBackup for Oracle to delete the corresponding image from the NetBackup repository regardless of the retention level.

Oracle Recovery Manager Repository Maintenance. Manually remove references to backup images from the Oracle RMAN repository. Use RMAN repository maintenance commands to remove references to backup files. You can use these commands to delete backup image information from both the Oracle RMAN repository and the NetBackup repository. For more information on the RMAN repository maintenance commands, refer to “Maintaining the RMAN Repository” on page 74.

When a request is issued to delete a backup file from the RMAN repository, RMAN sends the request to NetBackup for Oracle to delete the corresponding image from the NetBackup repository, regardless of the retention level.

Specifying the List of Scripts

The File list in a database policy has a different meaning than the File list has for other policies. Normally, in a Windows policy, you would list files and folders to be backed up. But since you are now configuring a database policy, you will list templates or scripts.

For a discussion of NetBackup for Oracle templates and shell scripts, see “Creating Templates and Shell Scripts” on page 55.

Add templates or shell scripts only if you are setting up a policy for automatic scheduling. All templates or shell scripts listed in the Files list will be executed for the Automatic Full Backup, Automatic Differential Incremental Backup, or Automatic Cumulative Incremental Backup schedules as specified under the **Schedules** tab.

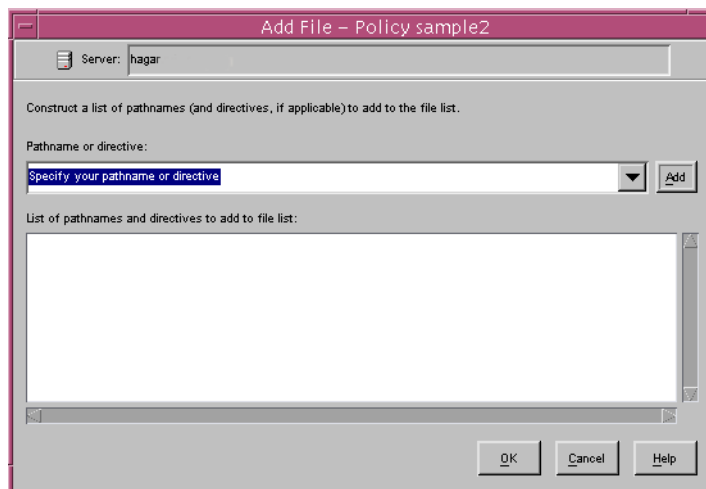
All templates or shell scripts specified in the Files list are executed during manual or automatic backups. NetBackup will start backups by running the templates or shell scripts in the order that they appear in the Files list.

▼ To add templates or shell scripts to the Scripts List

Caution Be sure to use the correct NetBackup for Oracle templates or shell script name in the file list to prevent an error or possibly a wrong operation.

1. In the left pane, click **Policies**.
2. In the All Policies pane, expand the policy you want to add the templates or shell scripts.
3. Right-click on **Files** and choose **New**.

The Add File dialog box appears. The title bar shows the name of the policy to which you are adding the shell scripts.



4. Type the name of the Oracle template or shell script.

Shell scripts:



Be sure to specify the full pathname when listing shell scripts. For example:

```
install_path\NetBackup\dbext\Oracle\samples\RMAN\cold_database_backup.cmd
```

Be sure that the shell scripts listed here are installed on each client in the Client list.

Templates:

Since templates are stored in a known location on the master server, only the template filename should be entered. For example:

```
weekly_full_backup.tpl
```

5. Click **Add**.
6. To add more scripts, repeat step 4 and step 5.

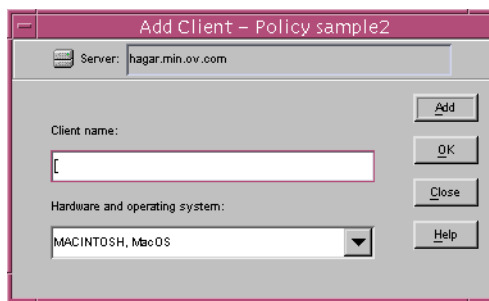
Adding Clients to a Policy

The client list is the list of clients on which your NetBackup for Oracle on Windows backups will be performed. A NetBackup client must be in at least one policy but can be in more than one.

▼ To add clients to a policy

1. In the left pane, expand **Policies**.
2. In the All Policies pane, expand the policy you wish to configure.
3. Right-click on **Clients** and choose **New**.

The Add Client dialog box appears. The title bar shows the name of the policy where you are adding clients.



4. In the **Client name** text box, type the name of the client that you are adding.

On the client the following should be installed:

- Oracle
- NetBackup client or server
- NetBackup for Oracle on Windows
- the backup shell script(s) (unless you are using templates)

5. Choose the hardware and operating system type and click **Add**.
6. If this is the last client, click **OK**. If you are going to add more clients, repeat step 4 and step 5.



Configuring the Run-Time Environment

The following is the order of precedence for the run-time configuration variable settings (when applicable).

1. vendor-specific string with `send` command
2. `parms` operand
3. environment variables

Refer to “Environment Variables Set Up by a User” on page 52 or “Environment Variables Set Up by NetBackup for Oracle” on page 52 for details.

Environment Variables Set Up by NetBackup for Oracle

When a schedule executes, NetBackup sets environment variables for templates and shell scripts to use when performing a NetBackup operation. These variables are set only if the backup is started from the server (either automatically by the NetBackup scheduler or manually through the administrator interface).

NB_ORA_SERV	Name of the NetBackup Server.
NB_ORA_POLICY	Name of the Oracle policy.
NB_ORA_CLIENT	Name of the NetBackup client that hosts the Oracle database.
NB_ORA_FULL	Set to 1 if this is an Automatic Full Backup.
NB_ORA_INCR	Set to 1 if this is an Automatic Differential Incremental Backup.
NB_ORA_CINC	Set to 1 if this is an Automatic Cumulative Incremental Backup.

Environment Variables Set Up by a User

Environment variables set by the user will take precedence over those set up by NetBackup for Oracle.

The NetBackup for Oracle on Windows variables that follow can be set for use in the Oracle user environment.

NB_ORA_SERV	Specifies the name of NetBackup master server.
-------------	--

NB_ORA_CLIENT

Specifies the name of the Oracle client. It is especially useful for redirecting a restore to a different client, or specifying a virtual client name in a cluster.

NB_ORA_POLICY

Specifies the name of the policy to use for the Oracle backup.

NB_ORA_SCHED

Specifies the name of the *Application Backup* schedule to use for the Oracle backup.

Oracle7 EBU Environment

You can set any of the environment variables from within the NetBackup for Oracle shell script.

For example, in the NetBackup for Oracle shell script, the following will specify what policy and server to use for a database backup in your Oracle environment.

```
set NB_ORA_POLICY your_policy
set NB_ORA_SERV your_server
```

Oracle RMAN Environment

Because components of RMAN run as Services on Windows, special attention should be given to environment variables. The environment that a Service runs in is established when the service is started, usually when the system is booted. Typically, a Service will run under the SYSTEM account so it will take on the System level environment settings. Because a Service provides RMAN functionality, an environment variable set at runtime will not be visible during a backup or restore.

Templates:

With Templates, NetBackup for Oracle on Windows environment variables are specified on the NetBackup for Oracle Configuration Variables Wizard page. See “Creating RMAN Templates Using the NetBackup for Oracle Backup Wizard” on page 58.

Shell scripts:

Use the “send” command or the “parms” operand to specify NetBackup for Oracle on Windows environment variables for use during a backup or restore. The `send` command was introduced with Oracle8i. If you are using an Oracle8.0.x version of RMAN, you must use the `parms` operand.

The `send` command sends a vendor-specific quoted string to NetBackup for Oracle on Windows.

For example, the following will specify what policy and server to use for a database backup.



```
run {
  allocate channel t1 type 'sbt_tape';
  allocate channel t2 type 'sbt_tape';
  send 'NB_ORA_POLICY=your_policy, NB_ORA_SERV=your_server';
  backup
    (database format 'bk_%U_%t');
}
```

Specify the variables in the string in the RMAN script after all channels have been allocated and before the backup command.

The `parms` operand can also be used to set environment variables at runtime.

The following example uses the `parms` operand to specify what policy and server to use for a database backup. `parms` is set with each allocate channel command in the shell script.

```
run {
  allocate channel t1 type 'sbt_tape'
  parms="ENV=(NB_ORA_POLICY=your_policy, NB_ORA_SERV=your_server) ";
  allocate channel t2 type 'sbt_tape'
  parms="ENV=(NB_ORA_POLICY=your_policy, NB_ORA_SERV=your_server) ";
  backup
    (database format 'bk_%s_%p_%t');
}
```

For more information on the `send` command and `parms` operand of an `rman` command, see the Oracle Backup and Recovery Guide.

Creating Templates and Shell Scripts

RMAN or EBU shell scripts and RMAN templates contain commands that are used to execute Netbackup for Oracle backup and recovery jobs. Scripts and templates must be created before NetBackup for Oracle can perform scheduled backups. These are the shell scripts or template files that are specified in policy configuration on the NetBackup server.

For more information on scripts, see the *Oracle7 Enterprise Backup Utility Administrator's Guide* or the Oracle Backup and Recovery Guide.

Enterprise Backup Utility

A NetBackup for Oracle shell script is necessary when an unattended scheduled backup is performed. These scripts are specified in the Oracle policy File or Script List. Refer to “Creating NetBackup for Oracle Scripts for Enterprise Backup Utility” on page 55.

An EBU script is necessary for an Oracle7 database. This script is specified as a parameter to the `ebu` command. The database administrator must create this script if it does not already exist. This must be done before using the Oracle7 Enterprise Backup Utility's `ebu` command. Refer to “Creating EBU Scripts” on page 56.

Creating NetBackup for Oracle Scripts for Enterprise Backup Utility

NetBackup for Oracle on Windows starts a scheduled job by executing a shell script file. For this example, the shell script is named `db_full_bk.cmd` and contains the following:

```
set ORACLE_HOME=C:\oracle7
set ORACLE_SID=orcl
set EBU_HOME=%ORACLE_HOME%\obackup\
set NB_ORA_POLICY=obk
%EBU_HOME%\ebu %ORACLE_HOME%\obackup\scripts\db.full.bk.rcv
```

Things to note in the script above are:

- ◆ Lines 1 - 3 are the environment variables that should be set for every `ebu` execution.
- ◆ Line 4 is used to explicitly set the policy used for this backup. We could have explicitly set other NetBackup for Oracle on Windows variables.
- ◆ Line 5 executes EBU with the full path name of the EBU script as a parameter, which contains the commands that `ebu` will execute to perform a full backup. See “Creating EBU Scripts” on page 56.



Creating EBU Scripts

The *Oracle7 Enterprise Backup Utility Administrator's Guide* explains the ebu command and command script files. Refer to that guide for details on command syntax and for parameters for performance. Here are some examples.

Example 1, Register the target database

```
register
  db_name = "PRODB"
  oracle_home = "c:\oracle7"
  pfile = "c:\oracle7\dfs\initPROD.ora"
  log = "c:\oracle7\obackup\log\obkPROD.log"
```

Example 2, Back up an offline database

```
backup offline database
  db_name = "PRODB"
  oracle_home = "c:\oracle7"
  log = "c:\oracle7\obackup\log\obkPROD.log"
```

Example 3, Perform an online backup of tablespace A and datafiles b1.dbf and b2.dbf

```
backup online
  db_name = "PRODB"
  dbfile = "c:\oracle7\dfs\b1.dbf", "c:\oracle7\dfs\b2.dbf"
  tablespace = "A"
  log = "c:\oracle7\obackup\log\obkPROD.log"
```

Example 4, Restore a database

```
restore database
  db_name = "PRODB"
  log = "c:\oracle7\obackup\log\obkPROD.log"
```

Example 5, Invalidate or delete a completed job

```
invalidate
  job_id = 4467
  log = "c:\oracle7\obackup\log\obkPROD.log"
```



Example 6, Cancel a job with log information dumped to standard output

```
cancel  
  job_id = 4489
```

Recovery Manager (RMAN)

RMAN Templates and Shell Scripts

Templates:

The NetBackup for Oracle Backup Wizard is used to create backup templates. This wizard is initiated from the NetBackup Client GUI. See “Creating RMAN Templates Using the NetBackup for Oracle Backup Wizard” on page 58.

The NetBackup for Oracle Backup Wizard does not support all of the RMAN commands and options provided by Oracle. A shell script should be written for situations where a template does not provide all of the required functionality.

Shell scripts:

Shell scripts are written by the user and must conform to RMAN and Windows Shell syntax. Sample backup and recovery shell scripts are installed on the client with the NetBackup for Oracle Agent. Modify these scripts to meet your individual requirements. See “Creating RMAN Scripts Manually” on page 65 for more information on sample scripts.

NetBackup for Oracle also provides a utility, `bpdbsbora`, that can generate a shell script from a Backup Wizard template. This allows a user to create a template with the Wizard, then generate a shell script from it. The user can then run the shell script, or modify the shell script further. See “Creating RMAN Shell Scripts Using `bpdbsbora`” on page 65.

Storing RMAN Templates and Shell Scripts

Templates:

The NetBackup for Oracle Backup Wizard saves a backup template in a NetBackup specific location on the current NetBackup master server. A backup template is retrieved from the master server as part of a backup (server-directed, scheduled, or user-directed) and is executed on the client. Backup templates are associated with a policy by specifying its name in the policy file or script list. Because backup templates are stored on the server in a known location, server directed and scheduled backups will use the same copy of the template for each client in the policy client list.



Templates store encrypted passwords that are decrypted at runtime.

Shell scripts:

RMAN shell scripts must reside on the NetBackup client. Backup shell scripts are associated with a policy by specifying the file name (including path) in the policy file or script list. This means that for server-directed or scheduled backups, each client in the policy's client list must have a copy of the script with the same name in the same location. See "Specifying the List of Scripts" on page 48.

The backup and recovery processes sometimes require passwords for Oracle database access and/or system user accounts. RMAN shell scripts, because a Shell interprets them, store passwords in clear text.

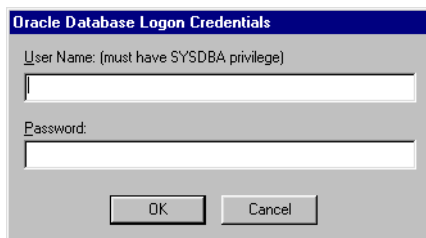
Creating RMAN Templates Using the NetBackup for Oracle Backup Wizard

NetBackup for Oracle includes a Backup Wizard that solicits information about desired RMAN backup operations. The wizard uses the information to create a template that can be run immediately or saved on the current master server for later use.

Please review your Oracle Backup and Recovery Guide for more information on backup strategies and RMAN functionality.

If NetBackup for Oracle is installed, the Backup, Archive, and Restore interface on the client displays an Oracle node in the left pane. From the client, expand the Oracle node in the left pane to view an Oracle instance hierarchy. Select a node in the left pane to view details in the right pane.

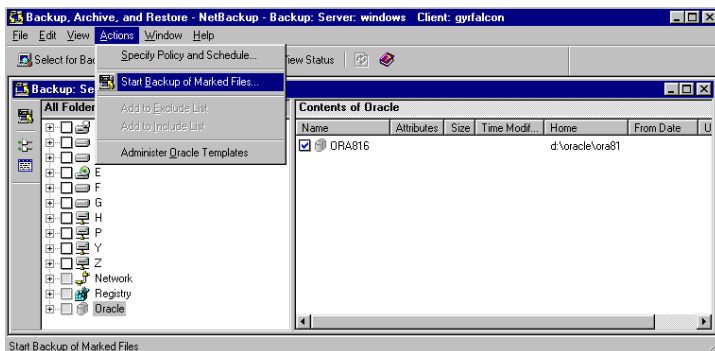
If your current login does not have Oracle SYSDBA privileges, the following dialog appears when you select an instance to expand:



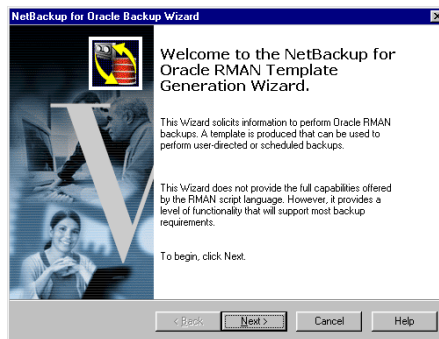
Enter your Oracle database login User name and Password with SYSDBA privileges to continue.

▼ To use the Backup Wizard

1. In the pane of the Backup, Archive, and Restore interface, select the Oracle instance. In the right pane, select the Oracle objects to back up. Go to **Actions->Start Backup of Marked Files**.



The Welcome screen appears.



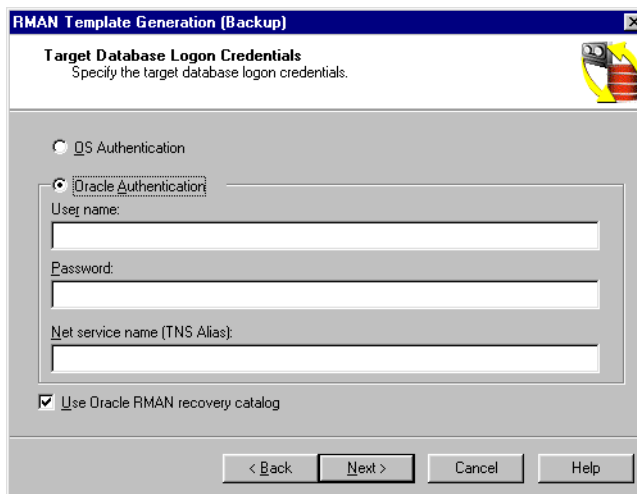
Click **Next** to continue.



2. Database administrators perform backup operations. Choose either operating system authentication or password files to authenticate database administrators.

The recovery catalog is a repository of information that is used and maintained by RMAN. You are not required to use a recovery catalog, but Oracle recommends it.

Click **Next** to continue.



RMAN Template Generation (Backup)

Target Database Logon Credentials
Specify the target database logon credentials.

☐ OS Authentication

☒ **Oracle Authentication**

User name:

Password:

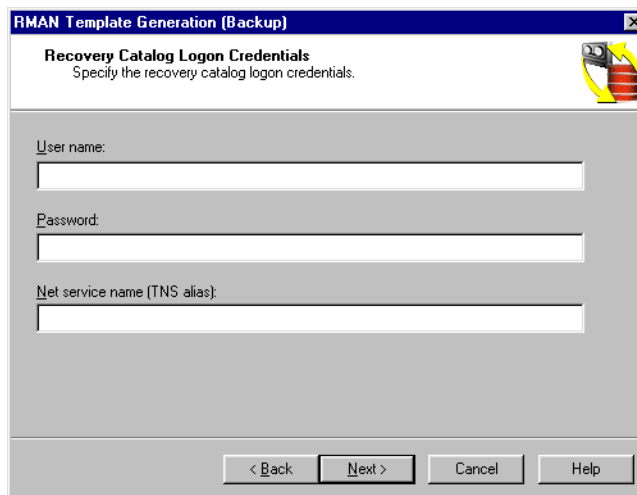
Net service name (TNS Alias):

☒ Use Oracle RMAN recovery catalog

< Back Next > Cancel Help

Note Only one Oracle SID can be specified at any one time in the environment. Therefore, if you are using a recovery catalog and thereby multiple Oracle SIDs, you will want to use a Net Service Name for either the target database (in Step 2) or the recovery catalog database (in Step 3). See the Oracle Net Administrator's Guide for more information on Net Service Names.

3. The Recovery Catalog consists of a set of Oracle tables and views used by Recovery Manager to manage the backup, restore, and recover of Oracle databases. The recovery catalog schema should not be set up on the same Oracle SID as the target database. The **User name**, **Password**, and **Net service name (TNS alias)** together make up the database connect string. Click **Next** to continue.



RMAN Template Generation (Backup)

Recovery Catalog Logon Credentials
Specify the recovery catalog logon credentials.

User name:

Password:

Net service name (TNS alias):

< Back Next > Cancel Help

4. An archived redo log is a copy of an online redo log that has been copied to an offline destination. If the database is in ARCHIVELOG mode, Oracle copies each online redo log as it is filled. Select **Include Archived Redo Logs in Backup** to back up the archived redo logs.

Select **All** to back up all of the archived redo logs.

Select **Range** to specify which archived redo logs to include in the backup. You can also opt to **Delete archived redo logs after they are backed up**.

Click **Next** to continue.

The screenshot shows the 'RMAN Template Generation (Backup)' dialog box. The title bar is blue with the text 'RMAN Template Generation (Backup)'. Below the title bar, the section is titled 'Archived Redo Logs' with the instruction 'Specify archived redo log options.' To the right of the title bar is a small icon of a tape drive. The main area contains several options: a checked checkbox 'Include Archived Redo Logs in Backup', two radio buttons 'All' (unselected) and 'Range' (selected), and two checked checkboxes 'From:' and 'Until:' with date and time pickers. The 'From:' picker shows '10/11/01' and '9:40:29 AM'. The 'Until:' picker shows '10/18/01' and '9:40:29 AM'. At the bottom, there is a checked checkbox 'Delete archived redo logs after they are backed up'. The bottom of the dialog has four buttons: '< Back', 'Next >', 'Cancel', and 'Help'.

5. Configuration refers to a set of parameters used as default values in subsequent wizard pages. You have the choice of using a **Default Configuration** supplied by NetBackup or an **Existing template configuration** by supplying a **Template name**.

The **Use an existing configuration** option allows you to:

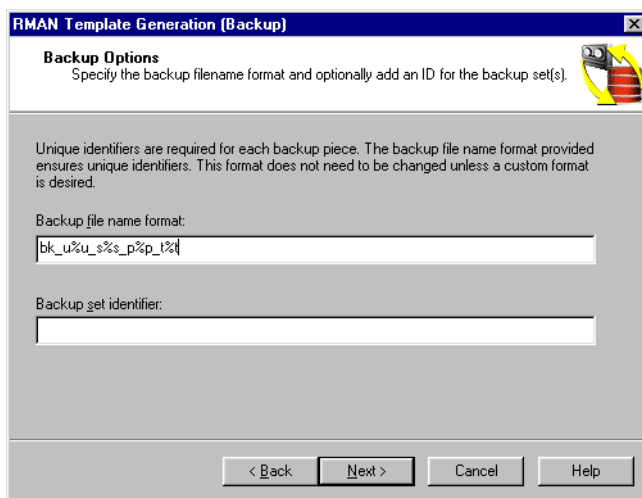
- use the same configuration at different times
- make minor changes to an existing configuration without having to start from scratch
- create a configuration similar to an existing configuration without having to define it from scratch.

The screenshot shows the 'RMAN Template Generation (Backup)' dialog box. The title bar is blue with the text 'RMAN Template Generation (Backup)'. Below the title bar, the section is titled 'Configuration Options' with the instruction 'Choose a configuration.' To the right of the title bar is a small icon of a tape drive. The main area contains the instruction 'Use the default configuration or an existing template's configuration.' Below this are two radio buttons: 'Default configuration' (unselected) and 'Existing template configuration:' (selected). Below the 'Existing template configuration:' radio button is a text field labeled 'Template name:' with a dropdown arrow. The bottom of the dialog has four buttons: '< Back', 'Next >', 'Cancel', and 'Help'.

Click **Next** to continue.

6. A backup set is a logical structure containing one or more physical backup pieces, such as datafiles or archived logs. Each backup piece must have a unique name.

Backup filename format specifies the file name format to use for the backup pieces created. **Backup set identifier** optionally specifies an identifier for the backup set(s). This is typically a meaningful name like “weekly_full_backup.”



The following substitution variables are available to aid in the generation of unique backup piece names:

%p	Specifies the backup piece number within the backup set
%s	Specifies the backup set number
%d	Specifies the database name
%n	Specifies the padded database name
%t	Specifies the backup set time stamp
%u	Specifies an 8 character name composed of compressed representations of the backup set number and the time the backup set was created.

The following are valid only with Oracle8.1 and later:

%c	Specifies the copy number of the backup piece within a set of duplexed backup pieces
%U	Specifies a shorthand for %u_%p_%c that guarantees uniqueness in generated backup file names

NetBackup recommends that a %t be placed at the end of the backup filename format. Without this timestamp, there may be performance degradation as the NetBackup catalog grows.

Caution Create a filename format that will generate unique filenames. In Oracle 8.0.x, non-unique filenames can cause backup data to be overwritten, resulting in possible loss of data. In later Oracle versions, non-unique filenames will result in error messages.

Click **Next** to continue.

7. Specify the database state. Choose the **OFFLINE BEFORE** option to shut down and start up the database in mount state before the backup. Choose the **ONLINE AFTER** option to shut down and start up the database in an open state after the backup completes successfully.

If you are starting the target database in the mount or open state, specify the **Oracle database initialization parameter file**.

The screenshot shows the 'RMAN Template Generation (Backup)' dialog box, specifically the 'Database State' screen. The title bar reads 'RMAN Template Generation (Backup)'. Below the title bar, the section 'Database State' is followed by the instruction 'Choose to stop and start the database before and after the backup.' A small icon of a database cylinder with a yellow arrow is in the top right corner. The main text area contains a note: 'A cold backup requires that the database be offline. The database can be automatically taken offline prior to the start of the backup.' There are two checkboxes: the first is checked and labeled '[Take the database OFFLINE BEFORE the backup starts:]', and the second is unchecked and labeled 'Bring the database ONLINE AFTER the backup completes.' Below these is a text field for 'Oracle database initialization parameter file:' with the path 'D:\Oracle\admin\ora816\pfile\init.ora' and a 'Browse' button. At the bottom are four buttons: '< Back', 'Next >', 'Cancel', and 'Help'.

Click **Next** to continue.

8. NetBackup normally executes a backup using configuration information defined in the policy and in configuration files. Use this screen to set or override certain configuration variables when the backup is started.

See “Configuring the Run-Time Environment” for more information on NetBackup configuration variables.

The screenshot shows the 'RMAN Template Generation (Backup)' dialog box, specifically the 'NetBackup for Oracle Configuration Variables' screen. The title bar reads 'RMAN Template Generation (Backup)'. Below the title bar, the section 'NetBackup for Oracle Configuration Variables' is followed by the instruction 'Provide values specific to this backup for the following configuration variables.' A small icon of a database cylinder with a yellow arrow is in the top right corner. The main text area contains a note: 'NetBackup normally executes a backup using defined configuration information from policy definitions and configuration files. However, in some environments, it may be necessary to set certain configuration variables when a backup is started.' Below this is another note: 'Any variables set below will be used during the backup and their values will have precedence over any previous setting.' There are four text fields arranged in two columns: 'Backup policy name:', 'Server name:', 'Schedule name:', and 'Client name:'. At the bottom are four buttons: '< Back', 'Next >', 'Cancel', and 'Help'.

9. On the **Backup Limits** screen, set parameter values for backup limiters.

Read rate specifies the maximum number of blocks per second that will be read from each input data file. **Size of a backup piece** sets the maximum size for each backup piece. **Number of open files** specifies the maximum number of input files that the backup will have open at any given time.

Number of files per backup set sets the maximum number of backup pieces to include in one backup set. Setting the **Size of the backup set** and the **Size of the backup set for archived redo logs** is useful if you want to make each backup set no larger than one tape.

The **Number of parallel streams** specifies the maximum number of connections between RMAN and a database instance. This value should be at least set to the number of storage devices used for the backup.

Click **Next** to continue.

10. This screen displays a summary of the information you provided.

You can review the template in the **Template Summary** window, and use the **Back** button to find and change incorrect wizard entries.

If the template appears correct, you can run it immediately after finishing the wizard, or save it to a NetBackup specific location on the

current master server. (Templates are not saved locally to the client.)

Click **Finish** to exit the wizard.

Creating RMAN Shell Scripts Using `bpdbsbora`

`bpdbsbora` is a NetBackup for Oracle command line utility used to initiate template based user-directed backup and recovery. This utility is also used to generate RMAN shell scripts from templates created by the Backup Wizard.

At the command prompt, type:

```
bpdbsbora -backup -g <script file name> -t <template name>
```

The following options are supported:

- | | |
|----------------------------------|---|
| <code>-g script file name</code> | Generates a shell script from a template. Enclose <i>script file name</i> in quotes if it contains blanks. This option may not be used with the run option. See “Using <code>bpdbsbora</code> ” on page 90. |
| <code>-t template name</code> | identifies the template.

<code>bpdbsbora</code> will retrieve backup templates from a known location on the master server. Therefore, specify only the file name. |

Creating RMAN Scripts Manually

Oracle Recovery Manager (RMAN) supports the following different types of backups:

- ◆ Full Backup
- ◆ Level 0 Backup (Level 0 Incremental)
- ◆ Level n Backup (Differential Incremental Backup)
- ◆ Level n Backup (Cumulative Incremental Backup)

When generating a datafile backup set, you can make either an incremental backup or a full backup. An incremental backup is a backup of one or more datafiles that contain only those blocks that have been modified since a previous backup. A full backup is a non-incremental backup of one or more datafiles that contain all blocks of the datafiles.

When NetBackup for Oracle on Windows was initially installed, example scripts were placed in the following directory:

```
install_path\NetBackup\dbext\Oracle\samples\rman
```

The Oracle example scripts installed are:



```
pit_database_restore.cmd  
hot_tablespace_backup.cmd  
hot_database_backup.cmd  
database_restore.cmd  
cold_duplex_database_backup_full.cmd  
cold_database_backup.cmd
```

1. Copy the example scripts to a different directory on your client. Oracle scripts can be located anywhere on the client.
2. Modify each script for your environment.

Example NetBackup for Oracle scripts for Recovery Manager can be found in Appendix A of this document. See “NetBackup for Oracle RMAN Scripts” on page 111 .

Database User Authentication and Server-Directed Backups

Because the NetBackup Client service is, by default, started under the `SYSTEM` account, special attention must also be given to database user authentication. The `SYSTEM` account will not have permission to connect to the target database if you are using OS Authentication instead of passwords. If you are using OS Authentication, you must run the NetBackup Client service under an account that has `SYSDBA` privilege. To do this:

1. From the Start menu, open Control Panel.
2. From the Control Panel, open Services.
3. Highlight **NetBackup Client Service** and click on **Stop**.
4. Click **Startup**.
5. From the **Log ON As:** pane, select **This Account**.
6. Type in the account name with `SYSDBA` privileges.
7. Type in the password.
8. Click **OK**.
9. Click **START** to restart the service.

For more information on OS Authentication, see your Oracle documentation.



Testing NetBackup for Oracle on Windows Configuration Settings

After you have configured the master server for NetBackup for Oracle on Windows, you should test the configuration settings. For a description of status codes, refer to the *NetBackup Troubleshooting Guide for Windows* if you are using a Windows server or the *NetBackup Troubleshooting Guide for UNIX* if you are using a UNIX server.

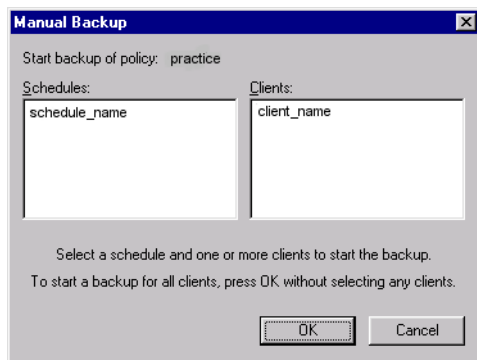
NetBackup Administration Console for Windows

Use this procedure to test a policy configuration from a Windows server or from the Remote Administration Console.

▼ To test the configuration settings on a Windows server

1. Log onto the server as administrator.
2. Start the NetBackup Administration Console.
3. In the left pane, click **Policies**. The policy list appears in the right pane.
4. Click on the policy you wish to test.
5. From the **Actions** menu, click **Manual Backup**.

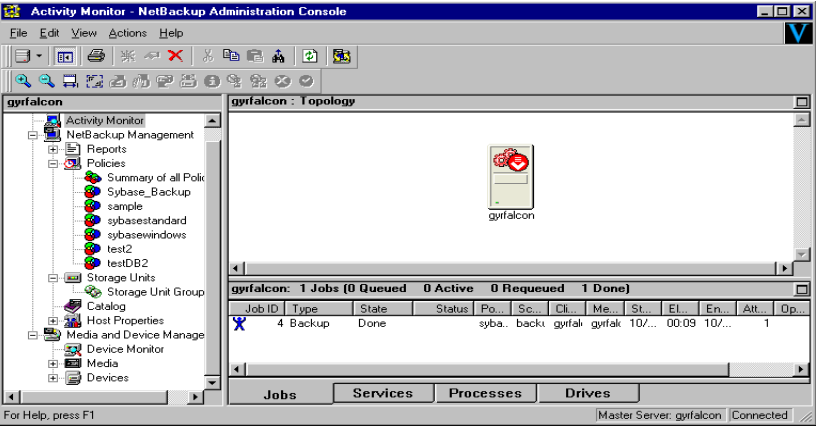
The Manual Backup dialog box appears.



The Schedules pane contains the name of a schedule (or schedules) configured for the policy you are going to test. The Clients pane contains the name of the client(s) listed in the policy you are going to test.

6. Follow the instructions on the dialog box.
7. Click **Activity Monitor** on the NetBackup Administration Console.

When the Activity Monitor indicates job completion, check the output of the script(s) indicated in the policy you tested. The script will indicate where the output is stored. It is usually in the same directory as the original script, and is similarly named.



If the manual backup does not exit with a successful status (as indicated by the Activity Monitor and in the script output), refer to the Troubleshooting chapter.

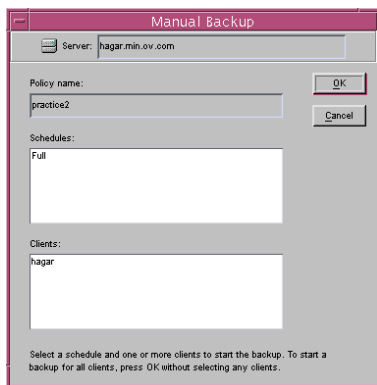


NetBackup Administration Console for UNIX

Use this procedure to test a policy configuration on the NetBackup Administration Console for UNIX.

▼ To test the configuration settings on a UNIX server

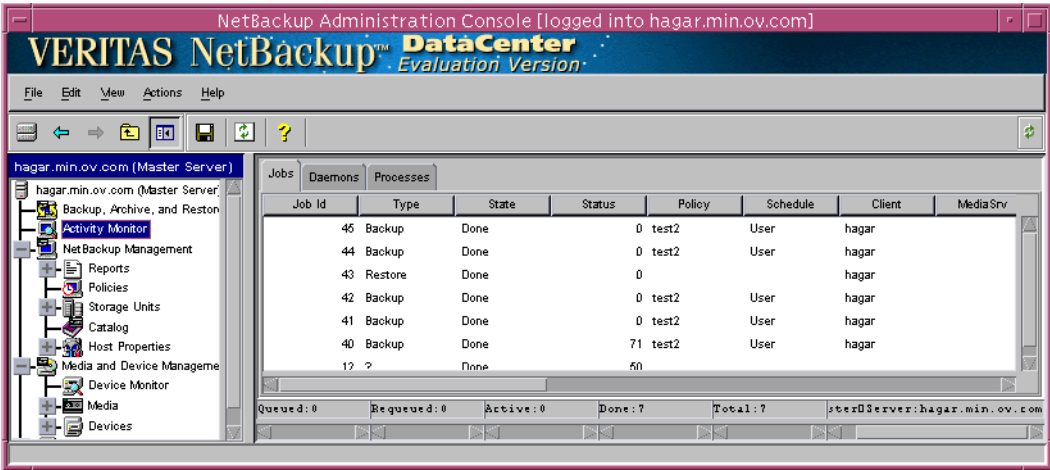
1. Log onto the server as root.
2. Start the NetBackup Administration Console.
3. In the left pane, click **Policies**.
The right pane splits into an All Policies pane and a details pane.
4. In the All Policies pane, click the policy you wish to test.
5. From the **Actions** menu, click **Manual Backup**.
The Manual Backup dialog box appears.



The Schedules pane contains the name of a schedule (or schedules) configured for the policy you are going to test. The Clients pane contains the name of the client(s) listed in the policy you are going to test.

6. Follow the instructions on the dialog box.
7. Click **Activity Monitor** on the NetBackup Administration Console.

When the Activity Monitor indicates job completion, check the output of the script(s) indicated in the policy you tested. The script will indicate where the output is stored. It is usually in the same directory as the original script, and is similarly named.



If the manual backup does not exit with a successful status (as indicated by the Activity Monitor and in the script output), refer to the Troubleshooting chapter.



Using NetBackup for Oracle on Windows

4

When installation and configuration is complete, you can use the NetBackup interfaces, the Oracle Enterprise Manager, or the command line interface to start Oracle backup and recovery, and to maintain the RMAN repository.

This chapter contains the following sections:

- ◆ Maintaining the RMAN Repository
- ◆ Querying the RMAN Repository
- ◆ Performing a Backup
- ◆ Browsing Backups
- ◆ Performing a Restore
- ◆ Performing Other ebu or RMAN Actions
- ◆ Using NetBackup for Oracle in a Microsoft Cluster Server Environment



Maintaining the RMAN Repository

The RMAN repository is the collection of metadata about your target databases that RMAN uses to conduct its backup, recovery, and maintenance operations. You can either create a recovery catalog in which to store this information or let RMAN store it exclusively in the target database control file. Although RMAN can conduct all major backup and recovery operations using just the control file, some RMAN commands function only when you use a recovery catalog. The following is a subset of repository maintenance commands provided by RMAN. Some of these commands may not be available with all versions of RMAN. Refer to your Oracle Backup and Recovery Guide for a complete description of maintenance commands for your version of RMAN.

Function	Description
Registering a database with the recovery catalog	Before using RMAN, you must register the target database in the recovery catalog. To do this, start and mount the target database but do not open it. At the RMAN prompt, issue a <code>register database</code> command.
Resetting the information in the recovery catalog	The <code>reset database</code> command directs RMAN to create a new database incarnation record in the recovery catalog.
Cross checking the information in the RMAN repository	<p>Because the Media Manager can mark tapes as expired, the RMAN repository can contain outdated information. To ensure that data in the recovery catalog or control file is in sync with data in the media management catalog, perform a cross check. Use the cross check feature to:</p> <ul style="list-style-type: none">◆ Determine whether a backup set is available or expired.◆ Delete any expired backup sets.◆ Call the media manager about the status of a backup piece and then mark it as available or expired. <p>Use either the <code>change ... crosscheck</code> or <code>crosscheck backup</code> command to check the specified files. Note that these commands do not delete images or repository records, you must use separate commands for these operations</p>

Function	Description
	<p>The <code>change ... crosscheck</code> command will query the media manager to determine if a backup piece is available. If a backup piece is unavailable, RMAN will mark the backup piece as expired. If it was expired but is now available, RMAN will mark the backup piece as available. The command syntax is:</p> <pre>change backuppiece {primary-key-list filename-list tag} crosscheck;</pre> <pre>change backupset {primary-key-list} crosscheck;</pre> <p>The <code>crosscheck backupset</code> command will operate on available and expired backup pieces. RMAN will update their status with the result (available or expired).</p> <p>To crosscheck a database, start RMAN and connect to the target database. Also connect to the recovery catalog if one is being used. At the <code>rman</code> command prompt, issue the following commands:</p> <pre>allocate channel for maintenance type 'sbt_tape'; crosscheck backupset of database;</pre>
Deleting expired backups	<p>The <code>delete expired backup</code> command will operate only on expired backup pieces found in the recovery catalog. RMAN will remove them from the recovery catalog.</p> <p>To delete expired backupsets of a database from the recovery catalog, start RMAN and connect to the target and recovery catalog databases. At the RMAN command prompt, issue the following commands:</p> <pre>allocate channel for maintenance type 'sbt_tape'; delete expired backupset of database;</pre> <p>The <code>crosscheck</code> and <code>delete backupset</code> commands allow you to restrict the list of objects operated on to the specified device type (i.e., disk or tape), object type (i.e., archived logs or database files), and date range.</p>
Resynchronizing the recovery catalog	<p>RMAN compares the recovery catalog to either the current control file of the target database or a backup control file and updates it with information that is missing or changed.</p> <p>If you are running in ARCHIVELOG mode, resynchronize the recovery catalog regularly since the recovery catalog is not updated automatically when a log switch occurs or when a redo log is archived.</p>



Function	Description
Changing the availability of a backup set or file copy	<p>You must also resynchronize the recovery catalog after making any change to the physical structure of the target database. As with log archive operations, the recovery catalog is not automatically updated when a physical schema change is made.</p> <p>The RMAN <code>backup</code>, <code>copy</code>, <code>restore</code>, and <code>switch</code> commands update the recovery catalog automatically when the target database control file is available and the recovery catalog database is available when any of these commands are executed.</p> <p>If the recovery catalog is unavailable when you issue <code>backup</code> or <code>copy</code> commands, you should resynchronize it manually.</p> <p>To resynchronize the recovery catalog, start RMAN and issue the <code>resync catalog</code> command.</p>
	<p>You may periodically need to notify RMAN that the status of a backup set, backup piece, datafile copy, or archived redo log has changed. The RMAN <code>change</code> command enables you to make a variety of useful record changes.</p>
	<p>The <code>change ... uncatalog</code> command removes references to a backup piece, datafile copy, or archivelog from the recovery catalog. This command works only with a recovery catalog.</p>
	<p>The <code>change ... delete</code> command removes references to a backup piece, datafile copy, or archivelog from the control file and recovery catalog. It physically deletes the file. This command works with or without a recovery catalog.</p>
	<p>The <code>change ... crosscheck</code> command removes references to a backup piece, datafile copy, or archivelog from the control and recovery catalog when that file no longer exists. This command works with or without a recovery catalog.</p>
	<p>The <code>change ... unavailable</code> command marks a backup piece, datafile copy, or archivelog as unavailable. This command works only with a recovery catalog.</p>
Validating the restore of backups	<p>A restore validation executes a restore test run without actually restoring the files. Test the restore of the entire database or individual tablespaces, datafiles, or control files.</p>
	<p>Use <code>restore ... validate</code> when you want RMAN to choose which backups should be tested.</p> <p>Use <code>validate backupset</code> when you want to specify which backup sets should be tested.</p>

Querying the RMAN Repository

RMAN allows you to generate a number of reports relevant for backup and recovery using the `report` and `list` commands. The `list` command lists the contents of the recovery catalog or control file, while the `report` command performs a more detailed analysis.

Use the `report` and `list` commands to determine what you have backed up as well as what you need to back up. The information is available whether or not you use a recovery catalog.

You can use the `report` command to answer questions, such as:

- ◆ Which files need a backup?
- ◆ Which files have not had a backup in a while?
- ◆ Which files are not recoverable due to unrecoverable operations?
- ◆ Which backup files can be deleted?
- ◆ What was the physical schema of the database at some previous point in time?

The `list` command queries the recovery catalog and control file and produces a listing of its contents. The primary purpose of the `list` command is to determine which backups are available. You can list:

- ◆ Backup sets containing a backup of a specified list of datafiles.
- ◆ Backup sets containing a backup of any datafile that is a member of a specified list of tablespaces.
- ◆ All backup sets or copies of all datafiles in the database.
- ◆ Backup sets containing a backup of any archive logs with a specified name and/or within a specified range.
- ◆ Incarnations of a specified database or of all databases known to the recovery catalog.

Refer to your Oracle Backup and Recovery Guide for more details on querying the RMAN repository.



Performing a Backup

Backups can be performed by using:

- ◆ Automatic Backup of an Oracle Policy
- ◆ Manual Backup of an Oracle Policy
- ◆ User-Directed Backup From the Client
 - Executing the NetBackup for Oracle template on the client
 - Using RMAN Template Administration
 - Using `bpdbsbora`
 - Executing the NetBackup for Oracle shell script on the client
 - Executing `ebu` or `rman` on the Client

Automatic Backup of an Oracle Policy

The most convenient way to back up your database is to set up schedules for automatic backups. When the NetBackup scheduler invokes a schedule for an automatic backup, the NetBackup for Oracle templates or shell scripts run:

- ◆ In the same order as they appear in the file list
- ◆ On all clients in the client list

The NetBackup for Oracle templates or shell scripts start the database backup by executing `ebu` or `rman`.

When the backup is started through NetBackup, NetBackup for Oracle leaves error checking for EBU or RMAN. The `ebu` or `rman` command generates an error if it considers a command invalid, but allows any of the commands it normally considers valid to proceed. This means that by specifying the wrong script file name you could start an unintended operation.

Manual Backup of an Oracle Policy

The administrator can use the NetBackup server software to manually execute an automatic backup schedule for the Oracle policy. See the *NetBackup System Administrator's Guide for UNIX* or the *NetBackup System Administrator's Guide for Windows* for detailed instructions.

Refer to “Testing NetBackup for Oracle on Windows Configuration Settings” on page 68 for instructions on initiating a manual backup of an Oracle policy.

User-Directed Backup From the Client

This section describes several ways to perform a User-Directed Backup.

Executing NetBackup for Oracle Templates on the Client

Using RMAN Template Administration

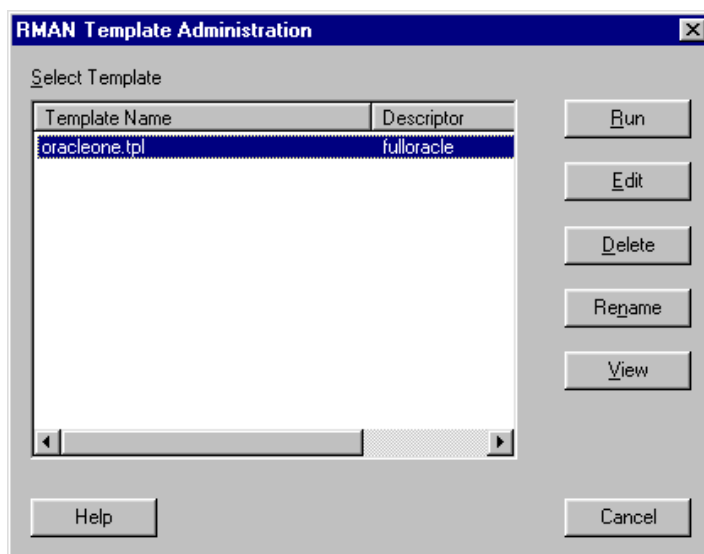
The RMAN Template Administration dialog is available in the NetBackup Backup, Archive, and Restore interface.

Use this dialog to run, edit, delete, rename, and view existing backup templates. These are the templates created by the NetBackup for Oracle Backup Wizard and stored in a pre-determined location on the master server. See “Creating RMAN Templates Using the NetBackup for Oracle Backup Wizard” on page 58

▼ To use RMAN Template Administration

1. In the Backup, Archive, and Restore interface, click **Actions->Administer Oracle Templates**.

The RMAN Template Administration window appears:



The Select Template list shows the names and descriptions of the RMAN backup templates stored on the current master server.



2. Select the name of the backup template you wish to run.
3. Click **Run**.

You can use the View Status tool to see the status of the backup. Click **Actions -> View Status**.

The RMAN Template Administration window provides the following functions:

Run	Run executes the selected template.
Edit	Edit is used to change the contents of an existing template. The selected template is loaded into the <i>NetBackup for Oracle RMAN Template Generation Wizard</i> .
Delete	Delete is used to delete the selected template. You must be a System Administrator or the template creator to delete a template.
Rename	Rename is used to change the name of the selected template. You must be a System Administrator or the template creator to rename a template.
View	View is used to see a summary of the selected template.

Using `bpdbsbora`

The `bpdbsbora` command allows you to run a backup template created by the NetBackup for Oracle Backup Wizard.

At the command prompt, type:

```
bpdbsbora -backup -r -t <template name>
```

where `-r` runs a template and `-t` identifies the template.

For example:

```
bpdbsbora -backup -r -t ORCL_Mon_full.tpl
```

`bpdbsbora` will retrieve backup templates from a pre-determined location on the master server. Therefore, specify only the file name.

Executing the NetBackup for Oracle Shell Script on the Client

If you know the pathname of the NetBackup for Oracle shell script that initiates the backup, you can execute the shell script from the Windows command prompt.



For example, to perform a database backup, at the Windows command prompt you might enter:

```
N:\oracle\scripts\cold_database_backup.cmd
```

The Windows shell starts the database backup by executing the Oracle shell script. The Oracle shell script contains commands to execute `ebu` or `rman`.

The NetBackup for Oracle installation script installs sample scripts in the following location:

```
install_path\NetBackup\dbext\oracle\samples\rman\
```

Executing `ebu` or `rman`

As an Oracle user you can also execute the `ebu` or `rman` command at the Windows command prompt with the EBU or RMAN command file as a parameter.

The following describes how to set the master server to windows and the Oracle Policy to obk before starting the backup.

`ebu`

At the command prompt, enter:

```
set NB_ORA_SERV=windows
set NB_ORA_POLICY=obk
ebu N:\Oracle7\scripts\bd_full_backup.rcv
```

where `db_full_backup.rcv` contains the EBU commands.

`rman`

Since RMAN functionality executes as a service, we must use the `parms` operand to set up the runtime environment. To start a backup using the `rman` command from the command prompt, type:

```
rman target internal/oracle@ORCL rcvcat rman/rman@RCAT cmdfile
"N:\oracle\scripts\db_full_backup.rcv"
```

In this example `db_full_backup.rcv` would contain the command `parms = "ENV = (NB_ORA_SERV = windows, NB_ORA_POLICY = obk)"` to set the server to windows and the policy to obk. See “Oracle RMAN Environment” on page 53 for more details.

Note Use the NetBackup parameters `NB_ORA_SERV`, `NB_ORA_CLIENT`, `NB_ORA_POLICY`, and `NB_ORA_SCHED` to specify the NetBackup run-time configuration. Otherwise, the order of precedence for the run-time configuration variable settings is used. See “Configuring the Run-Time Environment” on page 63.



Browsing Backups

This section describes the following procedures for browsing backup image:

- ◆ Using the RMAN Repository to Browse Backups
- ◆ Using `bplist` to Browse Backups

Using the RMAN Repository to Browse Backups

You can use the `RMAN report` and `list` commands to browse Oracle backups. Refer to “Maintaining the RMAN Repository” on page 74.

Using `bplist` to Browse Backups

You can use the `bplist` command to browse Oracle backups. The result is the list of backup file names. The following example uses `bplist` to search all Oracle backups for a client named `jupiter`.

```
install_path\NetBackup\bin\bbplist -C jupiter -t 4 -R \  
\exb_n2bm5bco_1_1392342936  
\exb_mabm02ko_1_1392170136  
\exb_lqbltds6_1_1392083334
```

The `-t 4` on this command specifies the Oracle backups. The `-R` specifies the default number of directory levels to search, 999. Refer to `bplist(1M)` man page for more information on this command.

Performing a Restore

Make sure a backup has been successfully completed before attempting a restore. An error will occur if a backup history does not exist.

This section describes the following procedures for performing user-directed restores:

- ◆ Executing the NetBackup for Oracle template on the client
 - Using the NetBackup Restore Wizard
 - Using bpdbsbora
- ◆ Executing the NetBackup for Oracle shell script on the client
- ◆ Executing `ebu` or `rman` on the client
- ◆ Redirecting a Restore to a Different Client
 - Using `rman`
 - Using `ebu`

Executing the NetBackup for Oracle Template on the Client

Using the NetBackup for Oracle Recovery Wizard

NetBackup for Oracle includes a Recovery Wizard that solicits information from the user about the desired RMAN restore and recover operations. The wizard uses the information to create a template that can be used immediately or saved for later use.

The NetBackup for Oracle Recovery Wizard saves a recovery template locally, in a user-specified location on the NetBackup client. Recovery templates are not stored on the server because recovery is always user directed, not scheduled. Under normal circumstances, a recovery template will be run immediately and then deleted.

The recovery process sometimes requires passwords for Oracle database access and system user accounts. Templates store encrypted passwords that are decrypted at runtime.

Because recovery can be a complex process, it may be necessary to perform manual steps as part of the operation. Please review your Oracle Backup and Recovery Guide for more information.



Starting the NetBackup Backup, Archive, and Restore Interface

The NetBackup for Oracle Recovery Wizard is launched from the Backup, Archive, and Restore interface. You can access the interface through the NetBackup Administration Console, or from the Start menu.

- ❖ To start the interface from the NetBackup Administration Console, click **File->Backup, Archive, and Restore**.
- ❖ To start the NetBackup Backup, Archive, and Restore interface on the client, click **Start->Programs->VERITAS NetBackup->Backup, Archive, and Restore**.

The Restore window

Click **Select for Restore** and expand the Oracle node in the left pane to view an Oracle instance hierarchy. Select a node in the left pane to view details in the right pane.

Note that if the Oracle node is not visible, it's possible that your NetBackup for Oracle client does not have the appropriate policy type specified. Change the policy type with the following steps.

▼ To change the client policy type

1. On the **File** menu, select **Specify NetBackup Machines**.
2. On the Specify NetBackup Machines dialog, click the **Source Client/Policy Type** tab.
3. In the **Policy Type** drop down list, select **Oracle**.
4. Click **OK**.

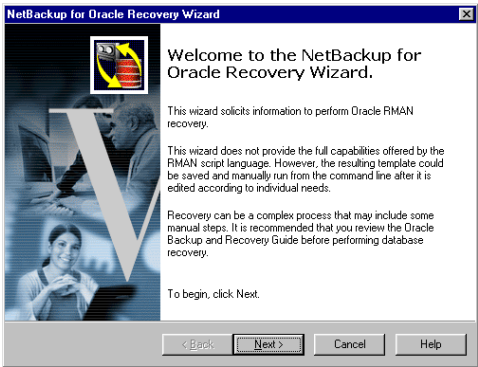
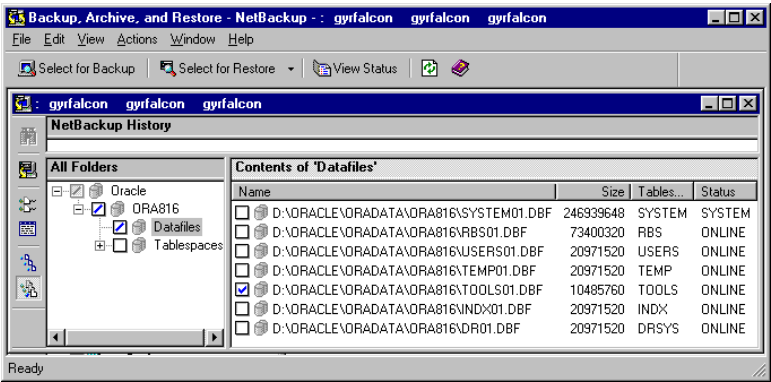
Using the Recovery Wizard

When you are ready to perform a recovery, follow these steps to create and run a template with the Recovery Wizard.

▼ To use the Recovery Wizard

1. In the left pane of the Backup, Archive, and Restore interface, select the Oracle instance. In the right pane, select the Oracle database object you wish to restore. Go to **Actions->Start Restore of Marked Files**.

The Welcome screen appears.



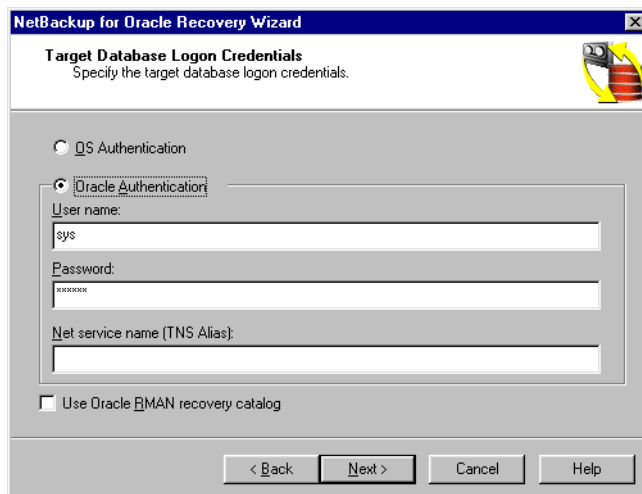
Click **Next** to continue.



2. Database administrators perform recovery operations. Choose either operating system authentication or password files to authenticate database administrators.

The recovery catalog is a repository of information that is used and maintained by RMAN. You are not required to use a recovery catalog, but Oracle recommends it.

Click **Next** to continue.

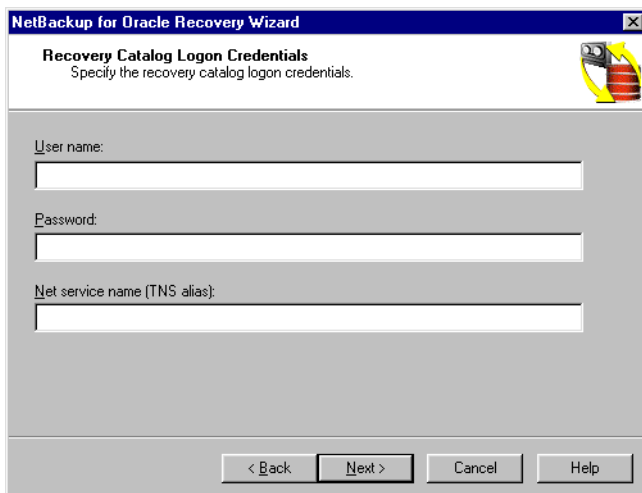


The dialog box is titled "NetBackup for Oracle Recovery Wizard" and "Target Database Logon Credentials". It contains the instruction "Specify the target database logon credentials." There are two radio buttons: "OS Authentication" (unselected) and "Oracle Authentication" (selected). Below the radio buttons are three text input fields: "User name:" with the value "sys", "Password:" with masked characters, and "Net service name (TNS Alias):" which is empty. At the bottom, there is a checkbox "Use Oracle RMAN recovery catalog" which is unchecked. Navigation buttons at the bottom include "< Back", "Next >", "Cancel", and "Help".

Note Only one Oracle SID can be specified at any one time in the environment. Therefore, if you are using a recovery catalog and thereby multiple Oracle SIDs, you will want to use a Net Service Name for either the target database (in Step 2) or the recovery catalog database (in Step 3). See the Oracle Net Administrator's Guide for more information.

3. The Recovery Catalog consists of a set of Oracle tables and views used by Recovery Manager to manage the backup, restore, and recover of Oracle databases. The recovery catalog schema must not be set up in the same Oracle SID as the target database. The **User name**, **Password**, and **Net service name (TNS alias)** together make up the database connect string.

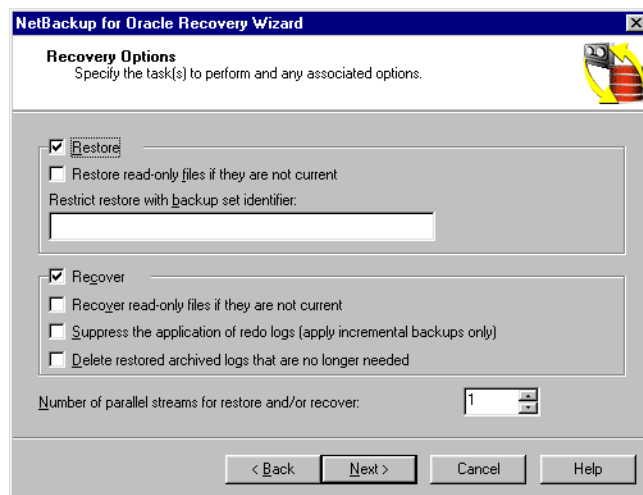
Click **Next** to continue.



The dialog box is titled "NetBackup for Oracle Recovery Wizard" and "Recovery Catalog Logon Credentials". It contains the instruction "Specify the recovery catalog logon credentials." There are three text input fields: "User name:", "Password:", and "Net service name (TNS alias):", all of which are empty. Navigation buttons at the bottom include "< Back", "Next >", "Cancel", and "Help".

4. A restore is retrieving or reconstructing data from a backup. A recover is making the backup current, or current to a specific point in time. Normally you will want to both restore and recover.

RMAN by default does not restore read-only files. Checking the **Restore read-only files if they are not current** box will cause RMAN to restore any read-only files that do not meet all of the conditions for being current.



Specifying a backup set identifier overrides the RMAN default of restoring the most recent available backup.

RMAN by default does not recover read-only files. Checking the **Recover read-only files if they are not current** box will cause RMAN to recover any read-only files that do not meet all of the conditions for currency.

The option **Suppress the application of redo logs (apply incremental backups only)** is intended for recovery of NOARCHIVELOG databases using incremental backups. In this situation, if you do not specify this option when recovering a NOARCHIVELOG database, Oracle aborts and issues an error.

For both restore and recover, the **Number of parallel streams** specifies the maximum number of connections between RMAN and a database instance.

Click **Next** to continue.



5. This screen appears if you chose **Restore** on the Recovery options screen.

When restoring for a point-in-time recovery, specify a backup set limiter.

If you use a redo log sequence number, indicate the thread number for the redo log in question.

Click **Next** to continue.

The screenshot shows the 'NetBackup for Oracle Recovery Wizard' window with the 'Restore Limits' tab selected. The title bar reads 'NetBackup for Oracle Recovery Wizard'. The main heading is 'Restore Limits' with the subtitle 'Indicate which backup sets to restore from.' Below this, a paragraph explains: 'When restoring a database object, the most recent backup will be used. If you want to use an older backup, you must limit the selection to those backup sets that would be suitable for performing your point-in-time recovery.' There are three radio button options: 'Restore from most recent backup sets' (unselected), 'Restore from backup sets limited by:' (selected), and 'Restore from backup sets limited by:' (disabled). The 'Restore from backup sets limited by:' option has three sub-options: 'Date/Time:' (selected) with a date of '10/16/01' and a time of '4:53:56 PM', 'System Change Number:' (unselected) with a value of '0', and 'Log Sequence Number:' (unselected) with a value of '0' and a thread number of '0'. At the bottom, there are four buttons: '< Back', 'Next >', 'Cancel', and 'Help'.

6. This screen appears if you chose **Recover** on the Recovery Options screen.

Choose to make the files current, or choose to recover the files to a specific point-in-time

Click **Next** to continue.

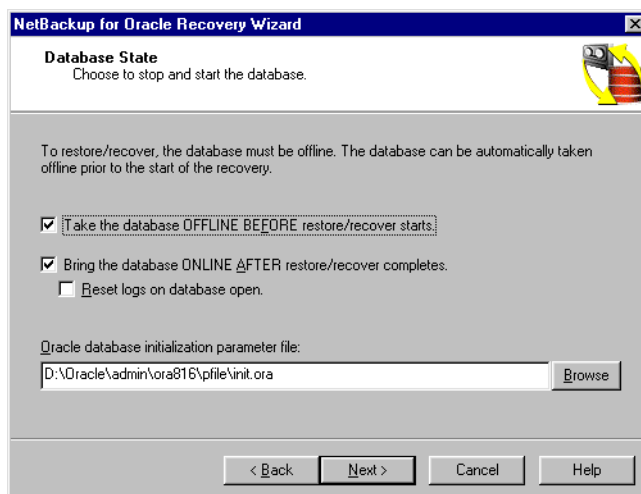
The screenshot shows the 'NetBackup for Oracle Recovery Wizard' window with the 'Recover Limits' tab selected. The title bar reads 'NetBackup for Oracle Recovery Wizard'. The main heading is 'Recover Limits' with the subtitle 'Specify an upper limit to recover to.' Below this, a paragraph explains: 'When recovering a database, all redo necessary to make the files current will be applied. If you want to recover to a specific point-in-time, you must specify an upper limit to recover to.' There are two radio button options: 'Recover to last committed transaction' (unselected) and 'Recover to a point-in-time limited by:' (selected). The 'Recover to a point-in-time limited by:' option has three sub-options: 'Date/Time:' (selected) with a date of '10/16/01' and a time of '4:54:20 PM', 'System Change Number:' (unselected) with a value of '0', and 'Log Sequence Number:' (unselected) with a value of '0' and a thread number of '0'. At the bottom, there are four buttons: '< Back', 'Next >', 'Cancel', and 'Help'.

7. Specify the database state. Choose the **OFFLINE BEFORE** option to shutdown and start up the database in mount state before the restore. Choose the **ONLINE AFTER** option to shut down and start up the database in an open state after the restore completes successfully.

If you are performing incomplete recovery, select **Reset logs on database open** to open the database with the RESETLOGS option.

If you are starting the target database in the mount or open state, specify the **Oracle database initialization parameter file**.

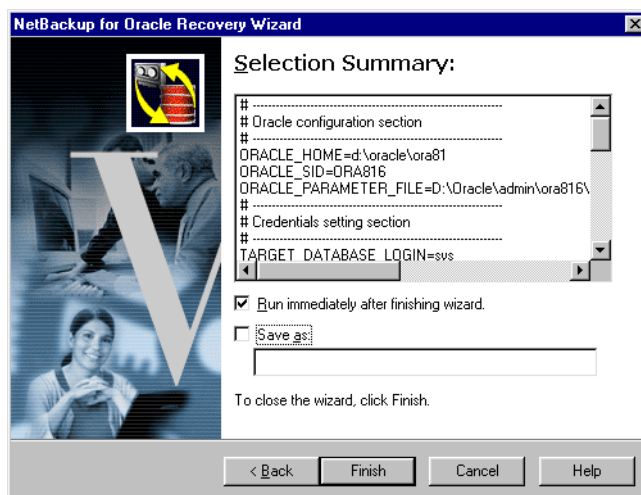
Click **Next** to continue.



8. This screen displays a summary of the information you provided.

You can review the template in the **Selection Summary** window, and use the Back button to find and change incorrect wizard entries.

If the template appears correct, you can run it immediately after finishing the wizard, or save it to a specified location on the client.



Note The location specified should include a fully qualified path to a folder where the user has write access.

Click **Finish** to exit the wizard.

Using `bpdbsbora`

The `bpdbsbora` command allows you to run a recovery template created by the NetBackup Recovery Wizard.

At the command line, type:

```
bpdbsbora -restore -r -t <template name>
```

where `-r` runs a template and `-t` identifies the template

For example:

```
bpdbsbora -restore -r -t H:\oracle\restore_templates\ORCL_MON_Full.tpl
```

Restore templates do not reside in a pre-determined location on the master server. They are considered to be temporary in nature and should reside on the client. If the full path is not specified as part of the restore template name, it must reside in the system search path.

Executing the NetBackup for Oracle Shell Script on the Client

If you know the pathname of the Oracle shell script that initiates the recovery, you can start it from the Windows command prompt. For example, to perform a database recovery at the Windows command prompt you might enter:

```
H:\oracle8\scripts\database_restore.cmd
```

The Windows shell starts the database restore by executing the Oracle shell script file. The Oracle shell script file contains commands to execute `ebu` or `rman`.

The NetBackup for Oracle installation script installs sample scripts in the following location:

```
install_path\NetBackup\dbext\oracle\samples\rman\
```

Executing `ebu` or `rman` on the Client

Execute the `ebu` or `rman` command from the Windows command prompt on the client, by using the appropriate EBU or RMAN command file as a parameter.

▼ To execute `ebu` or `rman` on the client

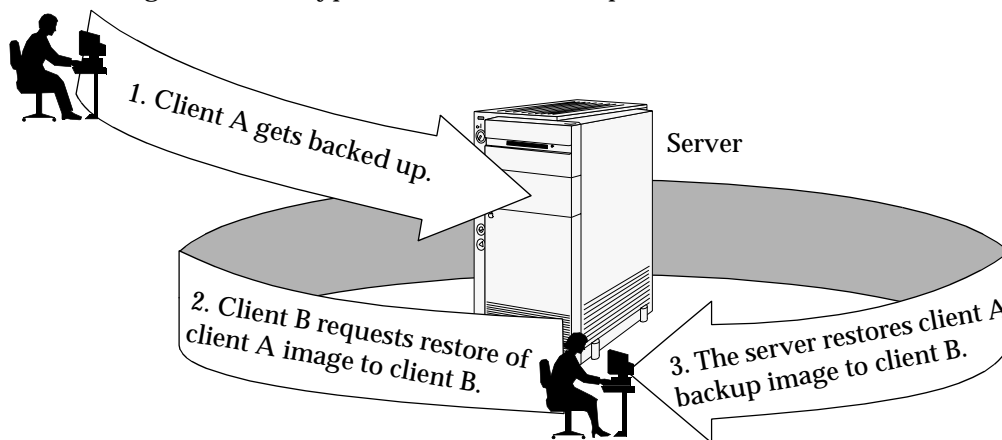
At the command prompt, enter:

```
rman target 'internal/oracle@ORCL' rcvcat 'rman/rman@RCAT'  
cmdfile 'H:\oracle8\scripts\database_restore.rcv'
```

Redirecting a Restore to a Different Client

With NetBackup for Oracle on Windows you have the option to restore a database to a client other than the one that originally performed the backup. The process of restoring data to another client is called a redirected restore.

The following illustrates a typical redirected restore process.



Note that the user on client A was not able to initiate a redirected restore to client B. Only the user on client B, the client receiving the backup image, could initiate the redirected restore.

The following methods for redirected restore are described in this section:

- ◆ Using Oracle EBU to perform a Redirected Restore
- ◆ Using Oracle RMAN to perform a Redirected Restore

Server Configuration

Ensure that the NetBackup server is configured to allow redirected restore. The administrator can remove restrictions for all clients by creating the following file on the Netbackup master sever:

```
install_path\netbackup\db\altnames\No.Restrictions
```

Or the administrator can restrict clients to restore only from certain other clients by creating and then adding client names to the file:

```
install_path\netbackup\db\altnames\client_name
```

Where *client_name* is the name of the client allowed to do the redirected restore.

See the *NetBackup System Administrator's Guide* for details.



Using EBU

Perform the following on the different destination host if you want to restore EBU backups that are owned by another client.

1. Enable a network connection to the EBU catalog database, which was used by the original client.
2. Set `ORACLE_SID` to the same value as the original database.
3. Set the environment variable, `NB_ORA_CLIENT`, to the original client.
4. Create the folder where the datafiles will be restored.
5. Specify `backup_host=original_client` in the EBU restore script.
6. Run the EBU restore script.

Example

In this example assume:

- Original client is camel
 - Different client is giraffe
 - Server is lion
 - `ORACLE_SID` is test
1. Create the file, `install_path\netbackup\db\altnames\giraffe`, on server lion.
 2. Set lion as the current server, using the NetBackup client GUI on giraffe.
 3. Modify the network `tnsnames.ora` file to enable EBU catalog connection.
 4. Set the environment variables `ORACLE_SID` to test and `NB_ORA_CLIENT` to camel.
 5. Make sure a restore folder exists.

The datafiles will be restored to a folder path with the same name they had when backed up.
 6. Run the restore script:

```
restore database
DB_NAME= "test"
backup_host= "camel"
log=C:\temp\rest_alt.log
```

Using RMAN to Perform a Redirected Restore

Perform the following on the different client host if you want to restore RMAN backups that are owned by another client.

1. Enable a network connection to the RMAN catalog database, which was used by the original client.

Note If the RMAN catalog database has been lost, restore the catalog database first before continuing with the redirected restore.

2. Use the `rman parms` option to set the environment variable, `NB_ORA_CLIENT`, to the original client.
3. Make the `init.ora` file of the source client available to the destination client. You can do this by copying the file to the destination client, or by modifying the file on the destination client. Change all location-specific parameters.
4. Create and start an Oracle Service for the previously set `ORACLE_SID`.
5. Create the folder where the datafiles will be restored.
6. Set up a password file for the destination client database.
7. Start up the database in the nomount state.
8. Start `rman`, connecting to the catalog and the target database.
9. Run an RMAN restore script.

Example

In this example assume:

- Original client is camel
- Different client is giraffe
- Server is lion
- `ORACLE_SID` is test



1. Create the file, `install_path\netbackup\db\altnames\No.Restrictions`, on server `lion`.
2. Modify the network `tnsnames.ora` file to enable RMAN catalog connection.
3. Create `inittest.ora`.
4. Using Oracle administration, create and start `ORACLESERVICETEST`.
5. Set the environment variables `ORACLE_SID` to test.
6. Make sure the folder exists and has appropriate access permissions.
The datafiles will be restored to a folder path with the same name they had when backed up.
7. Start up the database in a `nomount` state.
8. Run `rman`.

```
$rman rcvcat rman/rman@rcat
Recovery Manager: Release 8.0.5.0.0 - Production
RMAN> @restore_database.rcv
```

Where `restore_database.rcv` is:

```
run
{
# Allocates tape channel and sets RMAN environment variable
allocate channel t1 type 'SBT_TAPE'
parms="ENV=(NB_ORA_CLIENT=camel,NB_ORA_SERV=lion)";
restore
(database);
restore
controlfile to 'D:\orant805\database\ctl11TEST.ora';
release channel t1;
}
```

Performing Other `ebu` or `rman` Actions

To execute script files for database operations other than backups or restores, it is recommended that you execute the `ebu` or `rman` command directly rather than using NetBackup.

- ◆ For the `ebu` command script syntax and examples, see Appendix B in the *Oracle7 Enterprise Backup Utility Administrator's Guide*.
- ◆ For the `rman` command script syntax and examples, see the Oracle Backup and Recovery Guide.

Using NetBackup for Oracle in a Microsoft Cluster Server Environment

To use NetBackup for Oracle in a Microsoft Cluster Server environment, the following must be installed in the cluster nodes:

- ◆ NetBackup client or server (4.5)
- ◆ NetBackup for Oracle on Windows (4.5)
- ◆ Oracle Database version 8i Release 8.1.7 or greater
- ◆ Oracle Failsafe 3.11 for Oracle version 8i Release 8.1.7 or greater

NetBackup for Oracle users in a Microsoft Cluster Server Environment must take some additional steps to prepare for server and user-directed backups, and user-directed restores.

Automatic Backup of an Oracle Policy

The most convenient way to back up your clustered databases is to set up schedules for automatic backups. NetBackup for Oracle comes with sample scripts for clustered Oracle databases. The NetBackup for Oracle installation installs the sample scripts in the following location:

`install_path\NetBackup\dbext\oracle\samples\rman\`

Modify the scripts to give values to the following variables:

Oracle SID
Oracle Home
Cluster Name, Domain
Failsafe Home
Failsafe Userid
Failsafe Password



Failsafe Database Resource Name

Virtual Oracle Database Name.

For more information on how to back up or restore Microsoft cluster server using NetBackup, see the NetBackup System Administrator Guide for Windows.

Manual Backup of an Oracle Policy for a Microsoft Cluster Server Environment

Refer to “Testing NetBackup for Oracle on Windows Configuration Settings” on page 68 for instructions on initiating a manual backup of an Oracle policy.

User-Directed Backup or Restore from the Client

This section explains the process to prepare a Microsoft Cluster Server environment for a user-directed backup or restore operation.

1. Take the clustered Oracle database instance offline

- using the Failsafe Graphical User Interface

Select the Oracle database resource in the Failsafe Graphical User Interface, and choose to bring it offline

- using the Failsafe command line (FSCMD)

At the command line, type:

```
fscmd offline resource salesdb /cluster=curly /offline=immediate  
/domain=domainname /user=user /pwd=pwd
```

You can bring the resource offline based on your need.

<i>abort</i>	Shuts down the database instantaneously by aborting the database instance.
<i>immediate</i>	Shuts down the database immediately by terminating SQL statements in progress, rolling back uncommitted transactions and disconnecting users.
<i>normal</i>	Shuts down the database and doesn't allow new connections after the command was issued. This command waits for the connected users to disconnect before actually shutting down the database.

transactional Shuts down the database only after all of the current transactions have completed.

Because the `offline resource` operation shuts down the Oracle database service, start the Oracle database service with the following operation.

At the command line, type:

```
net start OracleService
```

2. Shut down and start up the database in mount state. This is necessary to perform administrative tasks like backup and recovery. Use the `svrmgrl` or `sqlplus` utility from Oracle.

At the command line, type:

```
Shutdown option [normal, abort, immediate]  
startup mount
```

Note When performing user directed backups, make sure you are on the node that owns the shared drive where the Oracle database is installed.

3. Perform the backup or recovery according to the directions for “Executing the NetBackup for Oracle Shell Script on the Client” on page 90.

Note When performing user-directed client restores with different configuration options of NetBackup failover media servers and a UNIX or Windows master server, refer to the section “Managing Client Restores” in the NetBackup System Administrator’s Guide for DataCenter on UNIX or on Windows.

4. Bring the Oracle database online with failsafe after the desired backup/restore is complete to enable it to fail over between the configured cluster of nodes.
 - using the Failsafe Graphical User Interface

Select the resource in the Failsafe Graphical User Interface, and choose to bring it offline.

- using the Failsafe command line (FSCMD)

At the command line, type:

```
fscmd online resource salesdb /cluster=curly /offline=immediate  
/domain=domainname /user= user /pwd=pwd
```





NetBackup, NetBackup for Oracle on Windows, and the Oracle Recovery Manager all provide reports on database operations. These reports are useful for finding errors associated with those applications.

- ◆ NetBackup and NetBackup for Oracle on Windows Logs
- ◆ Troubleshooting Procedure
- ◆ Backup or Restore Errors
- ◆ Poor Backup Performance Using Oracle7 Enterprise Backup Utility
- ◆ Excessive Tape Remounts



NetBackup and NetBackup for Oracle on Windows Logs

The following describes troubleshooting logs and reports generated by NetBackup products.

NetBackup for Oracle on Windows Logs

The NetBackup server and client software allow you to set up detailed debug logs for troubleshooting problems that occur outside of either NetBackup for Oracle on Windows or the Oracle Recovery Manager. See the *NetBackup Troubleshooting Guide for UNIX* or the *NetBackup Troubleshooting Guide for Windows* for a complete description of debug logs. To create logs automatically, run `install_path\NetBackup\logs\mklogdir.bat`.

Note These logs do not reveal errors that occur during the execution of the Oracle Recovery Manager, unless those errors also affect NetBackup for Oracle. Oracle may (or may not) use the NetBackup for Oracle logs for errors in the application. Your best sources for Oracle error information are the logs provided by Oracle.

Enable the NetBackup for Oracle on Windows logs by performing the following steps.

1. Create the following folders on the client:
2. `install_path\NetBackup\logs\bphdb`
`install_path\NetBackup\logs\dbclient`
`install_path\NetBackup\logs\bpdbsbora`
Make sure there is share access to the log folders.

The following sections describe the logs created when you create the log directories. Use a text editor to view the contents of the logs.

bphdb Folder on the Client

The `install_path\NetBackup\logs\bphdb` folder contains the following types of logs. These logs are a good starting place to determine what type of error occurred.

`oracle_stdout.mmddyy.hhmmss.txt`

Unless redirected elsewhere, NetBackup places NetBackup for Oracle templates or shell script output in this file.

`oracle_stderr.mmddyy.hhmmss.txt`

Unless redirected elsewhere, NetBackup places NetBackup for Oracle templates or shell script errors in this file.

`mmddyy.log`

bphdb is the NetBackup Database Backup binary. This log contains debugging information for the bphdb process. NetBackup for Oracle on Windows uses this client process for NetBackup for Oracle templates or shell script execution. It is invoked when an automatic backup schedule is executed.

dbclient Folder on the Client

The *install_path*\NetBackup\logs\dbclient folder contains the following execution log.

mmddyy.log

This log contains debugging information and execution status for the Oracle NetBackup client processes linked to the library program provided with NetBackup for Oracle on Windows.

bpdbsbora folder on the Client

The *install_path*\NetBackup\logs\bpdbsbora folder contains the following execution log.

mmddyy.log

This log contains debugging information and execution status for the bpdbsbora command line utility.

Setting the Debug Level

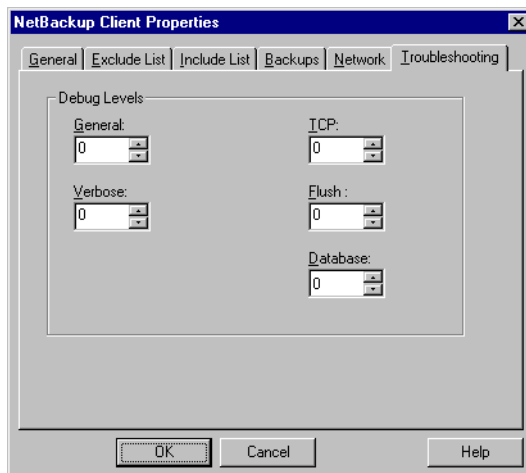
You can control the amount of information written to the debug log in the *install_path*\NetBackup\logs\dbclient folder by changing the Database debug level. The higher the value, the more information is logged. In everyday normal operations, the default value of 0 is sufficient. However, VERITAS technical support may ask you to set the value higher when a problem is being analyzed. 5 is the highest possible setting.

▼ To change the Debug Level

1. From the Start button, click **Programs->VERITAS NetBackup->Backup, Archive, and Restore**.
The Backup, Archive, and Restore interface appears.
2. From the File menu, select **NetBackup Client Properties**.



3. In the NetBackup Client Properties dialog box, select the **Troubleshooting** tab.



By default, the settings are zero.

4. Set the Database debug level.

Note Information from both settings will be logged to the same file, `mmddyy.log`

5. Stop and start the Oracle Database Services. This is necessary for `orasbt.dll` to pickup the new debug level.

NetBackup Server Reports

NetBackup provides other reports that are useful in isolating problems. One such report is All Logs Entries on the server. See the *NetBackup System Administrator's Guide* for a description of this and other reports.

Oracle7 Enterprise Backup Utility Logs

The Oracle7 Enterprise Backup Utility performs its own error logging and tracing in the file specified by the `log` and `trace` qualifier in the EBU script. Ensure that the EBU script specifies at least a log qualifier. Database administrators should refer to these files to determine what has happened during an `ebu` execution.

Oracle Recovery Manager Utility Logs

The Oracle Recovery Manager uses a command language interpreter, and can be executed in interactive or batch mode. You can specify a log file on the command line to record significant RMAN actions. The syntax is:

```
msglog 'logfile name'
```

Troubleshooting Procedure

Note For brevity, this chapter refers to the `orasbt.dll` as API.

To perform this procedure, the following conditions must exist.

If using the Oracle7 Enterprise Backup Utility (EBU), the following products are properly installed and configured:

- NetBackup 4.5
- Oracle7 RDBMS
- Oracle7 Enterprise Backup Utility
- NetBackup for Oracle on Windows 4.5

If using the Oracle Recovery Manager (RMAN), the following products are properly installed and configured:

- NetBackup 4.5
- Oracle RDBMS 8.0.4 or later
- NetBackup for Oracle on Windows 4.5

1. When verifying your installation, ensure that the following two NetBackup for Oracle on Windows binaries exist (in *install_path*/netbackup/bin for `bphdb.exe` and in `C:\Winnt\system32` for `orasbt.dll`):
 - `bphdb.exe` resides on the client and is used by both the NetBackup scheduler and the graphical interface to start backups. The main purpose of `bphdb` is to execute an Oracle template or shell script that in turn calls `ebu` or `rman`. Only the EBU or RMAN script is required when `ebu` or `rman` is executed from the command line.
 - `orasbt.dll` provides functions callable by the Oracle7 Enterprise Backup Utility or Oracle Recovery Manager.



2. Check that both the NetBackup server and client software are working properly. That is, check that normal operating system files can be backed up and restored from the client.

Note Oracle7 Enterprise Backup Utility does not have remote backup capability and must run on the same client as the Oracle database that is being backed up.

The following NetBackup logs are turned on in `VERBOSE` mode:

- On the client: `dbclient`, `bphdb`, `bplist`, and `bpcd`.
- On the master server: `bprd`, `bpsched`, and `bpdbm`.
- On the host with the storage unit: `bpbrm`, and `bptm`.

Note These logs may become very large, especially `bpsched` and `bpdbm`. Ensure that enough free disk space exists in the log folder disk partition.

Backup or Restore Errors

An Oracle7 Enterprise Backup Utility or Oracle Recovery Manager backup error can originate:

- ◆ On the NetBackup side

An error can be from the API, the NetBackup server or client, or Media Manager.

- ◆ On the Oracle side

The error can be from the Oracle7 Enterprise Backup Utility or Oracle Recovery Manager, or the target database.

VERITAS suggests that you use the following steps when troubleshooting a failed operation:

1. Check the logs to determine the source of the error.
2. Troubleshoot each stage of the backup or restore.

The following sections describe these steps in detail.

Check the Logs to Determine the Source of the Error

Determine whether the error is from NetBackup or the Oracle7 Enterprise Backup Utility or Oracle Recovery Manager.

If the error came from NetBackup, go to “Troubleshoot Each Stage of the Backup or Restore” on page 107.

Otherwise, have the Oracle database administrator or the NetBackup administrator look at the problem.

1. Check the Oracle log.

Messages are sent to the file name specified by

`log=`

in the EBU script or to the screen if `log=` is not specified.

Some common problems on the Oracle7 side are:

- The Oracle7 Enterprise Backup Utility did not locate and load the correct API library.
- The Oracle7 Enterprise Backup Utility was unable to connect to its Backup Catalog Instance or the target database.
- The target database is not in the appropriate mode: online, shutdown, or archivelog.
- An Oracle7 Enterprise Backup Utility Catalog error occurred. This can be due to an abnormal job termination that occurred earlier in the operation.

For Recovery Manager

Unless redirected, messages from RMAN are, by default, sent to `oracle_stdout.mmddyy.hhmmss.txt` in the `bphdb log` directory. You can redirect this output to another location by specifying `msglog filename` on the `rman` command line.

Some common problems on the Oracle RMAN side are:

- Oracle did not load the correct API
- Oracle Services are down
- `tnsnames.ora` is not properly configured
- RMAN was unable to connect to the database.
- The target database is not in the appropriate mode: online, mounted, or archivelog

The above errors are usually due to incorrect installation or configuration. Generally, after a failed operation, Oracle can clean up, but some user intervention may be required.

2. Check the NetBackup logs.



The first NetBackup log to check is

install_path\NetBackup\logs\dbclient\mmddyy.log. This is the most important log. Examine it closely. It contains messages that will provide the best way to determine the source of an error. This log is written by the API and contains:

- Requests from `ebu` or `rman`
- Activities between the API and NetBackup processes

If *install_path\NetBackup\logs\dbclient\mmddyy.log* does not contain any messages, the possible errors are:

- The Oracle7 Enterprise Backup Utility or the Oracle Recovery Manager did not load the correct API. This is an API or Oracle7 Enterprise Backup Utility installation problem.

On Windows NT this can be determined by looking in the *system_root\System32* folder for the file *orasbt_link.log*. This file will be created whenever the Oracle service is started and links with the NetBackup for Oracle on Windows library. Check the timestamp to verify that it has the same time as when the server started.

Refer to the “Installation” on page 17 for more details

- `ebu` or `rman` terminated due to some Oracle problem, before requesting service from NetBackup.

If this is an automatic or manual backup, check the *bphdb* log to see if the Oracle template or shell script was successfully started. If not, try to execute the shell script from the command line to determine the problem. Usually, the error is due to:

- A file permission problem for *bphdb*, *bpdbsbora* or the Oracle shell script file.
- The user does not have permission to run Oracle.
- Syntax errors or invalid command.
- The file cannot be found. Make sure the full Oracle shell script is entered correctly in the file list of the policy configuration.
- The template can not be found. Make sure the template exists on the master server and its name is entered correctly in the script or file list in the policy configuration.
- `rman` or `ebu` failed to execute
- The necessary environment variables are not set.

Troubleshoot Each Stage of the Backup or Restore

The following explains the sequence of events for an Oracle7 Enterprise Backup Utility or Oracle Recovery Manager initiated action and suggests solutions for problems that can occur at each point in the sequence.

1. `ebu` or `rman` starts.

A backup or restore can be started in any of the following ways:

- Command line from the system prompt such as:

For Oracle7 Enterprise Backup Utility Backup or Restore:

```
% ebu EBU script file name
```

For Oracle Recovery Manager Backup or Restore:

```
% rman target user/pwd[ @TNS alias] \
      rcvcat user/pwd[ @TNS alias] \
      cmdfile RMAN script file name
```

where *RMAN script file name* is fully qualified.

- Manually from the administrator interface on the master server.
- Automatically by an automatic backup schedule.

If an error occurs at this point, check the Oracle7 Enterprise Backup Utility or Oracle Recovery Manager log.

2. Oracle7 Enterprise Backup Utility or Oracle Recovery Manager verifies its environment, then issues requests to the API.

Some information such as the NetBackup version, API versions, and trace filename, are registered with the Oracle7 Enterprise Backup Utility or Oracle Recovery Manager.

An error at this point is usually due to a problem with client and server communication. Check the messages in the `bprd`, `bpsched`, and `bpcd` logs for clues.

3. Oracle7 Enterprise Backup Utility or Oracle Recovery Manager issues a backup or restore request.

The API gathers necessary parameters, and then sends the `backup` or `restore` request to the NetBackup server. The API waits until both the server and client are ready to transfer data before returning.

Oracle7 Enterprise Backup Utility or Oracle Recovery Manager requests a backup or restore by passing the following to the API:

- Filename it wants NetBackup to use



- Mode (backup or restore)
- Actual name of the Oracle data file
- Information about the target database

The API gathers information from the following:

- Environment
- Server configuration parameters
- Information file from bphdb to be used as parameters to the bprd process

The API then sends this information to the master server's bprd process.

To troubleshoot a problem in this part of the first sequence, examine the *install_path\NetBackup\logs\dbclient\mmddyy.log*.

- If the bprd process failed, check the logs for bprd, bpbrm, and bpsched.

A failure at this point is frequently due to bad NetBackup server or Oracle policy configuration parameters:

NetBackup can usually select the correct Oracle policy and schedules but not always when there are several Oracle policies in its database. Try setting the `SERVER` and `POLICY` values in the client environment.

4. Oracle7 Enterprise Backup Utility or Oracle Recovery Manager issues read or write requests to the API, which then transfers data to or from the NetBackup server.

A failure here is probably due to NetBackup media, network, or timeout errors.

5. Oracle7 Enterprise Backup Utility or Oracle Recovery Manager tells the API to close the session.

The API waits for the server to complete its necessary actions (backup image verification and so on) and then exits.

An error can originate from either NetBackup, Oracle7 Enterprise Backup Utility or Oracle Recovery Manager.

- Oracle7 Enterprise Backup Utility or Oracle Recovery Manager will abort if they encounter an error while reading a data file during the backup (for example, if Oracle blocks are out of sequence). It also aborts if NetBackup sends a bad backup image during the restore.
- NetBackup may return an error code to the API if for some reason it could not complete the backup successfully.

Poor Backup Performance Using Oracle7 Enterprise Backup Utility

If you find backups are slow, verify that performance is better when performing a non-database backup. If performance does not improve, troubleshoot NetBackup.

If performance is better, try tuning Oracle7 Enterprise Backup Utility by setting `DISK_IO_SIZE` or `BUFFER_SIZE` in an Oracle7 Enterprise Backup Utility parameter file or within your Oracle7 Enterprise Backup Utility scripts. For more tuning parameters, see the *Oracle7 Enterprise Backup Utility Administration Guide*.

Excessive Tape Remounts

Each backup set initiates a new NetBackup job. If you are using a robotic device that supports automatic volume recognition, tape mounts are not normally an issue. However, if you do not use such a device, you may notice a mount request prior to each job executing. This can become labor intensive. NetBackup provides parameters, `MEDIA_UNMOUNT_DELAY`, which will prevent unmounting a tape after it is used. This will keep the required tape on-line until Media Manager is manually instructed to dismount it. See the *NetBackup System Administrator's Guide - UNIX* or the *NetBackup System Administrator's Guide - Windows NT/2000* for more information.

Preventing Timeout Failures on Large Database Restores

Large database restores sometimes fail when multiple restore sessions compete for resources. In this situation, a restore session can be delayed waiting for media or device access. If the delay is too long, the restore session will timeout.

This problem can be resolved by increasing the NetBackup Client Read Timeout setting, which will prevent session timeouts and allow the restores to complete successfully.

Use the NetBackup Administration Console on the server to change the properties of each client that contains a database you may need to restore. The default for the Client Read Timeout setting is 300 seconds (5 minutes). For database agent clients, increase the value significantly to prevent timeout errors, e.g. 30 minutes.





NetBackup for Oracle RMAN Scripts

A

Example 1, cold_database_backup.cmd

This example sets the environment and calls `rman` with commands to perform a whole database backup. It is used for both full backups and incremental backups. When a schedule executes, NetBackup sets environment variables that the script uses to perform the backup.

The following is an Oracle script file named `cold_database_backup.cmd`, located in the `install_path\NetBackup\dbext\Oracle\samples\rman` folder.

```
@REM -----
@REM  cold_database_backup.cmd
@REM -----
@REM This script uses Recovery Manager to take a cold (consistent) database
@REM backup. A cold backup is one where the database is shutdown cleanly before
@REM performing the backup.
@REM -----

@setlocal ENABLEEXTENSIONS

@REM -----
@REM No need to echo the commands.
@REM -----

@echo off

@REM -----
@REM Put output in the same filename, different extension.
@REM-----

@set RMAN_LOG_FILE="%~dpn0.out"

@REM -----
@REM You may want to delete the previous output file so that backup information
@REM does not accumulate.  If not, delete the following command.
@REM -----
```



```

@if exist %RMAN_LOG_FILE% del %RMAN_LOG_FILE%

@REM -----
@REM Log the start of this script.
@REM -----

@for /F "tokens=1*" %%p in ('date /T') do @set DATE=%%p %%q
@for /F %%p in ('time /T') do @set DATE=%DATE% %%p

@echo ==== started on %DATE% ==== >> %RMAN_LOG_FILE%
@echo Script name: %0 >> %RMAN_LOG_FILE%

@REM -----
@REM Replace H:\oracle\ora81, below, with the Oracle home path.
@REM-----

@set ORACLE_HOME=H:\oracle\ora81

@REM -----
@REM Replace ora81, below, with the Oracle SID of the target database.
@REM -----

@set ORACLE_SID=ora81

@REM -----
@REM Several RMAN commands use time parameters that require NLS_LANG and
@REM NLS_DATE_FORMAT to be set. This example uses the standard date format.
@REM Replace below with the desired language values.
@REM -----

@set NLS_LANG=american
@set NLS_DATE_FORMAT=YYYY-MM-DD:hh24:mi:ss

@REM -----
@REM Replace the following with the fully qualified path name of the init file
@REM for the target database.
@REM -----

@set TARGET_INIT_FILE=h:\oracle\ora81\database\initora81.ora

@REM -----
@REM Replace productionDB, below, with the target database TNS alias (service)
@REM name from the tnsnames.ora file.
@REM -----

```

```

@set TARGET_TNS=productionDB

@REM -----
@REM Replace sqlplus with the appropriate Oracle utility call.
@REM For example, replace "sqlplus.exe /nolog" with svrmgrl.exe
@REM -----

@set CMD=%ORACLE_HOME%\bin\sqlplus.exe /nolog

@REM -----
@REM Replace sys/manager, below, with the target connect string.
@REM -----

@set TARGET_CONNECT_STR=sys/manager

@REM -----
@REM Oracle Recovery Manager name.
@REM -----

@set RMAN=%ORACLE_HOME%\bin\rman.exe

@REM -----
@REM Print out the value of the variables set by this script.
@REM -----

@echo #                                     >> %RMAN_LOG_FILE%
@echo TARGET_INIT_FILE: %TARGET_INIT_FILE% >> %RMAN_LOG_FILE%
@echo RMAN: %RMAN%                                     >> %RMAN_LOG_FILE%
@echo CMD: %CMD%                                       >> %RMAN_LOG_FILE%
@echo NLS_LANG : %NLS_LANG%                           >> %RMAN_LOG_FILE%
@echo ORACLE_SID : %ORACLE_SID%                       >> %RMAN_LOG_FILE%
@echo ORACLE_HOME: %ORACLE_HOME%                     >> %RMAN_LOG_FILE%
@echo NLS_DATE_FORMAT : %NLS_DATE_FORMAT% >> %RMAN_LOG_FILE%

@REM -----
@REM Print out the value of the variables set by bphdb.
@REM -----

@echo NB_ORA_FULL: %NB_ORA_FULL% >> %RMAN_LOG_FILE%
@echo NB_ORA_INCR: %NB_ORA_INCR% >> %RMAN_LOG_FILE%
@echo NB_ORA_CINC: %NB_ORA_CINC% >> %RMAN_LOG_FILE%
@echo NB_ORA_SERV: %NB_ORA_SERV% >> %RMAN_LOG_FILE%
@echo NB_ORA_POLICY: %NB_ORA_POLICY% >> %RMAN_LOG_FILE%

@REM -----
@REM Call Server Manager to shutdown the target database in immediate priority.

```



```

@REM This lets current calls to the database complete, but prevents further
@REM logons or calls.
@REM
@REM The shutdown-startup logic of this script can be commented out if you know
@REM that the database will always be mounted and in a consistent state before
@REM this script is executed.
@REM -----

@{
echo connect %TARGET_CONNECT_STR% as sysdba
echo shutdown immediate
echo exit
} | %CMD% >> %RMAN_LOG_FILE%

@REM -----
@REM Now we know that the database is cleanly closed and is ready for a
@REM cold backup. RMAN requires that the database be started and mounted
@REM to perform a backup.
@REM -----

@{
echo connect %TARGET_CONNECT_STR% as sysdba
echo startup mount pfile=%TARGET_INIT_FILE%
echo exit
} | %CMD% >> %RMAN_LOG_FILE%

@REM -----
@REM If this script is executed from a NetBackup schedule, NetBackup
@REM sets an NB_ORA environment variable based on the schedule type.
@REM For example, when:
@REM      schedule type is          BACKUP_TYPE is
@REM      -----
@REM Automatic Full                INCREMENTAL LEVEL=0
@REM Automatic Differential Incremental INCREMENTAL LEVEL=1
@REM Automatic Cumulative Incremental INCREMENTAL LEVEL=1 CUMULATIVE
@REM
@REM For user initiated backups, BACKUP_TYPE defaults to incremental
@REM level 0 (Full). To change the default for a user initiated
@REM backup to incremental or incremental cumulative, uncomment
@REM one of the following two lines.
@REM @set BACKUP_TYPE="INCREMENTAL LEVEL=1"
@REM @set BACKUP_TYPE="INCREMENTAL LEVEL=1 CUMULATIVE"
@REM
@REM Note that we use incremental level 0 to specify full backups.

```

```

@REM That is because, although they are identical in content, only
@REM the incremental level 0 backup can have incremental backups of
@REM level > 0 applied to it.
@REM -----

@REM -----
@REM What kind of backup will we perform.
@REM -----

@if "%NB_ORA_FULL%" EQU "1" @set BACKUP_TYPE=INCREMENTAL Level=0
@if "%NB_ORA_INCR%" EQU "1" @set BACKUP_TYPE=INCREMENTAL Level=1
@if "%NB_ORA_CINC%" EQU "1" @set BACKUP_TYPE=INCREMENTAL Level=1 CUMULATIVE
@if NOT DEFINED BACKUP_TYPE @set BACKUP_TYPE=INCREMENTAL Level=0

@REM -----
@REM Call Recovery Manager to initiate the backup. This example does not use a
@REM Recovery Catalog. If you choose to use one, remove the option, nocatalog,
@REM from the rman command line below and add a
@REM 'rcvcat <userid>/<passwd>@<tns alias>' statement.
@REM -----

@ (
echo RUN {
echo ALLOCATE CHANNEL ch00 TYPE 'SBT_TAPE';
echo ALLOCATE CHANNEL ch01 TYPE 'SBT_TAPE';
echo BACKUP
echo          %BACKUP_TYPE%
echo          FORMAT 'bk_u%%u_s%%s_p%%p_t%%t'
echo          DATABASE;
echo sql 'alter database open';
echo RELEASE CHANNEL ch00;
echo RELEASE CHANNEL ch01;
echo }
) | %RMAN% target %TARGET_CONNECT_STR%%TARGET_TNS% nocatalog msglog
  '%RMAN_LOG_FILE%' append

@SET ERRLEVEL=%errorlevel%

@REM -----
@REM NetBackup (bphdb) stores the name of a file in an environment variable,
@REM called STATUS_FILE. This file is used by an automatic schedule to
@REM communicate status information with NetBackup's job monitor. It is up to
@REM the script to write a 0 (passed) or 1 (failure) to the status file.
@REM -----

@if %ERRLEVEL% NEQ 0 goto err

```



```

@set LOGMSG=ended successfully
@if "%STATUS_FILE%" EQU "" goto end
@echo 0 > %STATUS_FILE%
@goto end

```

```

:err

```

```

@set LOGMSG=ended in error
@if "%STATUS_FILE%" EQU "" goto end
@echo 1 > %STATUS_FILE%

```

```

:end

```

```

@REM -----
@REM Log the completion of this script.
@REM -----

```

```

@for /F "tokens=1*" %p in ('date /T') do @set DATE=%p %q
@for /F %p in ('time /T') do @set DATE=%DATE% %p

```

```

@echo %0 >> %RMAN_LOG_FILE%
@echo ==== %LOGMSG% on %DATE% ==== >> %RMAN_LOG_FILE%
@endlocal
@REM End of Main Program -----

```

Example 2, hot_database_backup.cmd

This example sets up the environment and calls `rman` with commands to perform a whole database backup. It is used for both full backups and incremental backups. When a schedule executes, NetBackup sets environment variables that the script uses to perform the backup.

With the proper schedules this script could be used to automatically execute a backup every week on Friday night and a incremental backup each night for the rest of the week. See “Adding New Schedules” on page 28 for more details.

The following is an Oracle script file named `hot_database_backup.cmd`, located in the `install_path\NetBackup\dbext\Oracle\samples\rman` folder.

```

@REM
@REM -----
@REM hot_database_backup.cmd
@REM -----
@REM This script uses Recovery Manager to take a hot (inconsistent) database
@REM backup. A hot backup is inconsistent because portions of the database are

```



```

@REM being modified and written to the disk while the backup is progressing.
@REM You must run your database in ARCHIVELOG mode to make hot backups.
@REM -----

@setlocal ENABLEEXTENSIONS

@REM -----
@REM No need to echo the commands.
@REM -----

@echo off

@REM -----
@REM Put output in the same filename, different extension.
@REM -----

@set RMAN_LOG_FILE="%~dpn0.out"

@REM -----
@REM You may want to delete the output file so that backup information does
@REM not accumulate. If not, delete the following command.
@REM -----
@if exist %RMAN_LOG_FILE% del %RMAN_LOG_FILE%

@REM -----
@REM Replace H:\oracle\ora81, below, with the Oracle home path.
@REM -----

@set ORACLE_HOME=H:\oracle\ora81

@REM -----
@REM Replace ora81, below, with the Oracle SID.
@REM -----

@set ORACLE_SID=ora81

@REM -----
@REM Replace sys/manager, below, with the target connect string.
@REM -----

@set TARGET_CONNECT_STR=sys/manager

@REM -----
@REM Set the Oracle Recovery Manager.
@REM -----

```



```

@set RMAN=%ORACLE_HOME%\bin\rman.exe

@REM -----
@REM Log the start of this scripts.
@REM -----

@for /F "tokens=1*" %%p in ('date /T') do @set DATE=%%p %%q
@for /F %%p in ('time /T') do @set DATE=%DATE% %%p

@echo ==== started on %DATE% ==== >> %RMAN_LOG_FILE%
@echo Script name: %0 >> %RMAN_LOG_FILE%

@REM -----
@REM Several RMAN commands use time parameters that require NLS_LANG and
@REM NLS_DATE_FORMAT to be set. This example uses the standard date format.
@REM Replace below with the desired language values.
@REM -----

@set NLS_LANG=american
@set NLS_DATE_FORMAT=YYYY-MM-DD:hh24:mi:ss

@REM -----
@REM Print out environment variables set in this script.
@REM -----

@echo #                                >> %RMAN_LOG_FILE%
@echo RMAN      : %RMAN%                >> %RMAN_LOG_FILE%
@echo NLS_LANG   : %NLS_LANG%            >> %RMAN_LOG_FILE%
@echo ORACLE_HOME : %ORACLE_HOME%        >> %RMAN_LOG_FILE%
@echo ORACLE_SID  : %ORACLE_SID%         >> %RMAN_LOG_FILE%
@echo NLS_DATE_FORMAT : %NLS_DATE_FORMAT% >> %RMAN_LOG_FILE%
@echo RMAN_LOG_FILE : %RMAN_LOG_FILE%     >> %RMAN_LOG_FILE%

@REM -----
@REM Print out environment variables set in bphdb.
@REM -----

@echo NB_ORA_SERV : %NB_ORA_SERV%        >> %RMAN_LOG_FILE%
@echo NB_ORA_FULL  : %NB_ORA_FULL%        >> %RMAN_LOG_FILE%
@echo NB_ORA_INCR   : %NB_ORA_INCR%       >> %RMAN_LOG_FILE%
@echo NB_ORA_CINC    : %NB_ORA_CINC%      >> %RMAN_LOG_FILE%
@echo NB_ORA_CLASS  : %NB_ORA_CLASS%     >> %RMAN_LOG_FILE%

@REM -----
@REM We assume that the database is properly opened. If desired, this would
@REM be the place to verify that.

```



```

@REM -----

@REM -----
@REM If this script is executed from a NetBackup schedule, NetBackup
@REM sets an NB_ORA environment variable based on the schedule type.
@REM For example, when:
@REM     schedule type is          BACKUP_TYPE is
@REM     -----
@REM Automatic Full                INCREMENTAL LEVEL=0
@REM Automatic Differential Incremental INCREMENTAL LEVEL=1
@REM Automatic Cumulative Incremental INCREMENTAL LEVEL=1 CUMULATIVE
@REM
@REM For user initiated backups, BACKUP_TYPE defaults to incremental
@REM level 0 (Full). To change the default for a user initiated
@REM backup to incremental or incremental cumulative, uncomment
@REM one of the following two lines.
@REM @set BACKUP_TYPE="INCREMENTAL LEVEL=1"
@REM @set BACKUP_TYPE="INCREMENTAL LEVEL=1 CUMULATIVE"
@REM
@REM Note that we use incremental level 0 to specify full backups.
@REM That is because, although they are identical in content, only
@REM the incremental level 0 backup can have incremental backups of
@REM level > 0 applied to it.
@REM -----

@REM -----
@REM What kind of backup will we perform.
@REM -----

@if "%NB_ORA_FULL%" EQU "1" @set BACKUP_TYPE=INCREMENTAL Level=0
@if "%NB_ORA_INCR%" EQU "1" @set BACKUP_TYPE=INCREMENTAL Level=1
@if "%NB_ORA_CINC%" EQU "1" @set BACKUP_TYPE=INCREMENTAL Level=1 CUMULATIVE
@if NOT DEFINED BACKUP_TYPE @set BACKUP_TYPE=INCREMENTAL Level=0

@REM -----
@REM Call Recovery Manager to initiate the backup. This example does not use a
@REM Recovery Catalog. If you choose to use one, remove the option, nocatalog,
@REM from the rman command line below and add a
@REM 'rcvcat <userid>/<passwd>@<tns alias>' statement.
@REM -----

@{
echo RUN {
echo ALLOCATE CHANNEL ch00 TYPE 'SBT_TAPE';
echo ALLOCATE CHANNEL ch01 TYPE 'SBT_TAPE';
echo BACKUP

```



```

echo          %BACKUP_TYPE%
echo          FORMAT 'bk_u%%u_s%%s_p%%p_t%%t'
echo          DATABASE;
echo sql 'alter system archive log current';
echo RELEASE CHANNEL ch00;
echo RELEASE CHANNEL ch01;
echo # Backup all archive logs
echo ALLOCATE CHANNEL ch00 TYPE 'SBT_TAPE';
echo BACKUP
echo          FILESPERSET 20
echo          FORMAT 'arch-s%%s-p%%p'
echo          ARCHIVELOG ALL;
echo RELEASE CHANNEL ch00;
echo }
) | %RMAN% target %TARGET_CONNECT_STR% nocatalog msglog '%RMAN_LOG_FILE%'
  append

@set ERRLEVEL=%ERRORLEVEL%

@REM -----
@REM NetBackup (bphdb) stores the name of a file in an environment variable,
@REM called STATUS_FILE. This file is used by an automatic schedule to
@REM communicate status information with NetBackup's job monitor. It is up to
@REM the script to write a 0 (passed) or 1 (failure) to the status file.
@REM -----
@if %ERRLEVEL% NEQ 0 @goto err

@set LOGMSG=ended successfully
@if "%STATUS_FILE%" EQU "" goto end
@echo 0 > %STATUS_FILE%
@goto end

:err
@set LOGMSG=ended in error
@if "%STATUS_FILE%" EQU "" @goto end
@echo 1 > %STATUS_FILE%

:end

@REM -----
@REM Log the completion of this script.
@REM -----

@for /F "tokens=1*" %%p in ('date /T') do @set DATE=%%p %%q
@for /F %%p in ('time /T') do @set DATE=%DATE% %%p

@echo #   >> %RMAN_LOG_FILE%

```



```

@echo %==== %LOGMSG% on %DATE% ==== >> %RMAN_LOG_FILE%
@endlocal
@REM End of Main Program -----

```

Example 3, cold_duplex_database_backup_full.cmd

This example sets up the environment and calls `rman` to execute commands that will make identical copies of a cold (consistent) database backup.

The following is an Oracle script file named `cold_duplex_database_backup_full.cmd` in the `install_path\NetBackup\dbext\Oracle\samples\rman` folder.

```

@REM
@REM -----
@REM cold_duplex_database_backup_full.cmd
@REM -----
@REM This script uses Recovery Manager to make identical copies of a cold
@REM (consistent) database backup. A cold backup is one where the database
@REM is shutdown cleanly before performing the backup.
@REM
@REM You must enable (set to TRUE in the init.ora file) the
@REM BACKUP_TAPE_IO_SLAVES initialization parameter to perform duplexed
@REM backups. RMAN will configure as many slaves as needed for the number
@REM of backup copies you request. For more information on
@REM BACKUP_TAPE_IO_SLAVES, see the Oracle Reference.
@REM
@REM Note: this Oracle script contains commands that are only valid with
@REM Oracle release 8.1.x or greater.
@REM -----

@setlocal ENABLEEXTENSIONS

@REM -----
@REM No need to echo the commands.
@REM -----

@echo off

@REM -----
@REM Put output in the same filename, different extension.
@REM -----

@set RMAN_LOG_FILE="%~dpn0.out"

@REM -----

```



```
@REM You may want to delete the output file so that backup information does
@REM not accumulate.  If not, delete the following command.
```

```
@REM -----
```

```
@if exist %RMAN_LOG_FILE% del %RMAN_LOG_FILE%
```

```
@REM -----
```

```
@REM Log the start of this script.
```

```
@REM -----
```

```
@for /F "tokens=1*" %%p in ('date /T') do @set DATE=%%p %%q
```

```
@for /F %%p in ('time /T') do @set DATE=%DATE% %%p
```

```
@echo ==== started on %DATE% ==== >> %RMAN_LOG_FILE%
```

```
@echo Script name: %0 >> %RMAN_LOG_FILE%
```

```
@REM -----
```

```
@REM Replace H:\oracle\ora81, below, with the Oracle home path.
```

```
@REM -----
```

```
@set ORACLE_HOME=H:\oracle\ora81
```

```
@REM -----
```

```
@REM Replace ora81, below, with the Oracle SID of the target database.
```

```
@REM -----
```

```
@set ORACLE_SID=ora81
```

```
@REM -----
```

```
@REM Replace sqlplus with the appropriate Oracle utility call.
```

```
@REM For example, replace "sqlplus.exe /nolog" with svrmgrl.exe
```

```
@REM -----
```

```
@set CMD=%ORACLE_HOME%\bin\sqlplus.exe /nolog
```

```
@REM -----
```

```
@REM Replace the following with the fully qualified path name of the init file
```

```
@REM for the target database.
```

```
@REM -----
```

```
@set TARGET_INIT_FILE=h:\oracle\ora81\database\initora81.ora
```

```
@REM -----
```

```
@REM Replace sys/manager, below, with the target connect string.
```

```
@REM -----
```

```

@set TARGET_CONNECT_STR=sys/manager

@REM -----
@REM Replace productionDB, below, with the target database TNS alias (service)
@REM name from the tnsnames.ora file.
@REM -----

@set TARGET_TNS=productionDB

@REM -----
@REM Set the rcvcat connect string.
@REM Replace "rman/rman", below, with the rcvcat connect string.
@REM -----

RCVCAT_CONNECT_STR=rman/rman

@REM -----
@REM Replace rcvcatDB, below, with the recovery catalog database TNS alias
@REM (service) name from the tnsnames.ora file.
@REM -----

@set RCVCAT_TNS=rcvcatDB

@REM -----
@REM Several RMAN commands use time parameters that require NLS_LANG and
@REM NLS_DATE_FORMAT to be set. This example uses the standard date format.
@REM Replace below with the desired language values.
@REM -----

@set NLS_LANG=american
@set NLS_DATE_FORMAT=YYYY-MM-DD:hh24:mi:ss

@REM -----
@REM Set the Oracle Recovery Manager name.
@REM -----

@set RMAN=%ORACLE_HOME%\bin\rman.exe

@REM -----
@REM Print out the value of the variables set by this script. Won't be needing
@REM any of the variables set in bphdb.
@REM -----

@echo #                                     >> %RMAN_LOG_FILE%
@echo RMAN : %RMAN%                         >> %RMAN_LOG_FILE%
@echo CMD : %CMD%                           >> %RMAN_LOG_FILE%

```



```
@echo NLS_LANG : %NLS_LANG% >> %RMAN_LOG_FILE%
@echo TARGET_TNS : %TARGET_TNS% >> %RMAN_LOG_FILE%
@echo RCVCAT_TNS : %RCVCAT_TNS% >> %RMAN_LOG_FILE%
@echo ORACLE_HOME : %ORACLE_HOME% >> %RMAN_LOG_FILE%
@echo ORACLE_SID : %ORACLE_SID% >> %RMAN_LOG_FILE%
@echo NLS_DATE_FORMAT : %NLS_DATE_FORMAT% >> %RMAN_LOG_FILE%
```

```
@echo # >> %RMAN_LOG_FILE%
```

```
@REM -----
@REM Call Server Manager to shutdown the target database in immediate priority.
@REM This lets current calls to the database complete, but prevents further
@REM logons or calls.
@REM
@REM The shutdown-startup logic of this script can be commented out if you know
@REM that the database will always be mounted and in a consistent state before
@REM this script is executed.
@REM -----
```

```
@(
echo connect %TARGET_CONNECT_STR%@%TARGET_TNS% as sysdba
echo shutdown immediate
echo exit
) | %CMD% >> %RMAN_LOG_FILE%
```

```
@REM -----
@REM Now we know that the database is cleanly closed and is ready for a
@REM cold backup. RMAN requires that the database be started and mounted
@REM to perform a backup.
@REM -----
```

```
@(
echo connect %TARGET_CONNECT_STR%@%TARGET_TNS% as sysdba
echo startup mount pfile=%TARGET_INIT_FILE%
echo exit
) | %CMD% >> %RMAN_LOG_FILE%
```

```
@REM -----
@REM Call Recovery Manager to initiate the backup. This example uses a
@REM Recovery Catalog. If you choose not to use one, replace the option
@REM 'rcvcat <userid>/<passwd>@<tns alias>' with the 'nocatalog' option.
@REM
@REM Change user ids and passwords accordingly.
```



```

@REM -----

@echo #   >> %RMAN_LOG_FILE%
@{
echo RUN {
echo set duplex=ON;
echo ALLOCATE CHANNEL ch00 TYPE 'SBT_TAPE';
echo ALLOCATE CHANNEL ch01 TYPE 'SBT_TAPE';
echo send 'CPF1_POLICY=ColdDbFullBk_duplex, CPF1_SCHED=user_cp1';
echo send 'CPF2_POLICY=ColdDbFullBk_duplex, CPF2_SCHED=user_cp2';
echo BACKUP
echo      FULL
echo      TAG cold_db_bk_full
echo      FORMAT 'bk_U%%U_t%%t'
echo      DATABASE;
echo sql 'alter database open';
echo RELEASE CHANNEL ch00;
echo RELEASE CHANNEL ch01;
echo }
) |      %RMAN%      target      %TARGET_CONNECT_STR%@%TARGET_TNS%      rcvcat
  %RCVCAT_CONNECT_STR%@%RCVCAT_TNS% msglog '%RMAN_LOG_FILE%' append

@set ERRLEVEL=%ERRORLEVEL%

@REM -----
@REM NetBackup (bphdb) stores the name of a file in an environment variable,
@REM called STATUS_FILE. This file is used by an automatic schedule to
@REM communicate status information with NetBackup's job monitor. It is up to
@REM the script to write a 0 (passed) or 1 (failure) to the status file.
@REM -----

@if %ERRLEVEL% NEQ 0 goto err

@set LOGMSG=ended successfully
@if "%STATUS_FILE%" EQU "" goto end
@echo 0 > %STATUS_FILE%
@goto end

:err

@set LOGMSG=ended in error
@if "%STATUS_FILE%" EQU "" goto end
@echo 1 > %STATUS_FILE%

:end

```



```

@REM -----
@REM Log the completion of this script.
@REM -----

@for /F "tokens=1*" %%p in ('date /T') do @set DATE=%%p %%q
@for /F %%p in ('time /T') do @set DATE=%DATE% %%p

@echo %0  >> %RMAN_LOG_FILE%
@echo %==== %LOGMSG% on %DATE% ==== >> %RMAN_LOG_FILE%
@endlocal
@REM End of Main Program -----
#

```

Oracle8i and later RMAN provides an API that allows you to make up to four backup sets simultaneously, each an exact duplicate of the others. Using NetBackup for Oracle, you can back up each copy to a different tape to protect against disaster, media damage, or human error. You must use the `set duplex` and the `send` commands to take advantage of this feature.

The `set duplex` command specifies the number of copies of each backup piece that should be created. The `set duplex` command affects all channels allocated after issuing the command and is in effect until explicitly disabled or changed during the session. You cannot issue the `set duplex` command after allocating a channel.

The command syntax is:

```
set duplex = {ON | OFF | 1 | 2 | 3 | 4}
```

By default, duplex is `OFF` (a single backup set is produced). If you specify `ON`, two identical backup sets are produced.

Each output file must have a unique name. You should use the `%U` format specifier to satisfy this restriction. `%U` is equivalent to `%u_%p_%c` and it guarantees the uniqueness of the backup set name in all circumstances.

Note that you must enable the `BACKUP_TAPE_IO_SLAVES` initialization parameter to perform duplexed backups. RMAN will configure as many media as needed for the number of backup copies you request. For more information on `BACKUP_TAPE_IO_SLAVES`, see the Oracle Reference.

Use the `send` command to specify the policy and/or schedule to use with each backup. Because NetBackup for Oracle uses the policy or schedule to determine what media to use, this information is required for each copy, or an error will occur.

The command syntax is:

```
send 'keyword=value [, keyword=value,...]';
```

The keywords to specify policy are: CPF1_POLICY, CPF2_POLICY, CPF3_POLICY, and CPF4_POLICY, which specify the backup policy for duplexed file 1 through duplexed file 4.

The keywords used to specify schedule are: CPF1_SCHED, CPF2_SCHED, CPF3_SCHED, and CPF4_SCHED, which specify the Application Backup schedule for duplexed file 1 through duplexed file 4.





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